THE ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER
ESTABLISHED 1872

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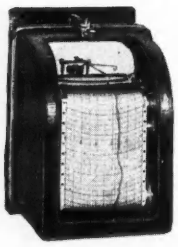

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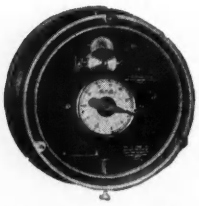

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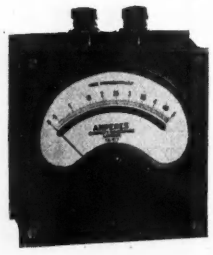

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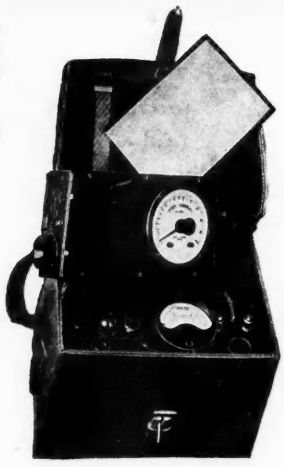

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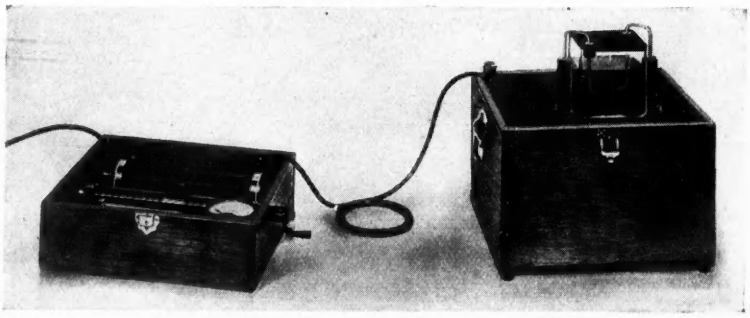

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THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

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The Immediate Outlook

Adjustment to War Conditions

LOOKING back upon 1939 one realises that the war started many months before the official proclamation and that the whole of the year was coloured by it. In such conditions it is remarkable that trade was so well sustained and that the first eight months were so successful. In a way it is a good augury for the future.

Up to July, when the Commissioners issued their last figures, the output of electricity showed an increase of 13.8 per cent. over the figure for the corresponding period of 1938, while electrical exports for the first eight months of the year were only about 7 per cent. lower. The reports of electrical manufacturing companies issued during the year, and the chairmen's speeches at the annual meetings, disclosed a continuance, or even an increase, of prosperity for the most part. While, no doubt, military requirements were responsible for a good deal of activity, it was generally stressed that, apart from this, business had been good and looked like being maintained.

The declaration of war naturally put an immediate brake on activities in many directions. The prompt imposition of a fuel rationing scheme, combined with the " lights out " order and restrictions upon capital expenditure, hit electricity supply authorities rather hard. At the same time uncertainties with regard to the export situation created by the enemy's submarine campaign and by the necessity to retain essential equipment and materials at home seriously upset the calculations of electrical exporters.

Relaxation of Restrictions

No doubt in view of the strong possibility of immediate air attack all these precautions were essential and had to be taken immediately. It was the suddenness of it all which caused the trouble ; in 1914 and onwards the nation had time to adjust itself more gradually to the new conditions. As it turned out, the prompt mass onslaught from the air did not occur, and, we may hope, never will. The result has been that a measure of relaxation is now considered permissible. First to go was fuel rationing which, although never actually put into operation, caused an immense fall in electricity consumption which resulted in underloaded plant and very little fuel saving. Worse still, it caused a very great decline in the purchase of domestic electrical apparatus, affecting to a serious extent the business of many manufacturers of these appliances, dealers and electrical contractors.

Their situation was worsened by the ban on capital expenditure by local authorities which led to a sudden suspension of hire and hire-purchase schemes. A more liberal interpretation of the term " public need," which justifies such expenditure, seems to be favoured by the Electricity Commissioners and so we can look forward to a resumption of the schemes, albeit in a somewhat restricted form. The essential " blackout " also had adverse results upon the business of supply authorities and manufacturers but it is to be hoped that the very much modified form of street lighting now permitted will not only improve the public's spirits and increase its safety, but also help the industry.

Export Prospects

Then, as we have already shown, the virtual ban upon the export of certain heavy plant has been lifted, and although licences are still required there is no difficulty in obtaining them. With very few exceptions other varieties of electrical equipment are not subject to the licensing condition and it is the Government's avowed intention to do all that can be done to encourage export trade. This encouragement must take the form of a guarantee of the availability of the materials necessary to fulfil overseas contracts as well as some kind of protection against the effects of price increases during the execution of the work. These matters, we have been assured, are receiving the close attention of the Government. We mentioned one important step to assist exporters a fortnight ago—the handing over to manufacturers' associations of the task of allocating raw materials for export orders.

It is to be hoped that all these measures will be put into operation as early as possible and thus provide full justification for the optimism which has been expressed lately by a number of leading electrical manufacturers. The war has to be paid for and export is the best means. But we have also to look beyond the war and by keeping our lines of communication with overseas markets in working order we shall ease the task of readjustment to the peacetime conditions which we all hope to see re-established soon.

Engineers' Salaries

WHAT is a borough electrical engineer worth? We have always considered that such men have an intrinsic market value which can be gauged by the salaries paid to men in corresponding jobs with company-owned undertakings. But some town councillors (at Macclesfield for instance) do not accept this view. To them the electrical engineer is not the head of a commercial undertaking but just another local government officer. Consequently they are dismayed if it is proposed (as it was at Macclesfield) to pay the electrical engineer more than the town clerk. A good town clerk is a valuable asset to a town; if he is considered to be of greater value than the electrical engineer the proper course is to raise his salary, not to reduce the engineer's. We are glad to see that the Macclesfield Council decided to adhere to the A.M.E.E. scale in fixing the salary of its new electrical engineer and manager.

The Small Firm's Part

MANY of the smaller concerns in the electrical industry are wondering how they are to be fitted into the new scheme of things brought about by the war: whether they can expect a share of the orders which the Ministry of Supply is placing. Some observations on the subject were made to a Press gathering last week by the Minister, Mr. L. Burgin. He pointed out that the Ministry's aim was to secure equipment as rapidly and quickly as possible, and for this reason it was necessary to place orders which involved immense quantities of repetition work with firms possessing very great resources. Nevertheless, there were many classes of order which could suitably be distributed among a number of smaller firms, and the policy was to do this, even if it involved a little delay and slightly increased cost. Mr. Burgin stressed the fact that the Ministry was at all times open to suggestions from these smaller concerns, and work would be given to them whenever it was at all possible. One proposal that he made was that groups of these firms should consider the pooling of their resources to enable them to take on larger orders.

Whole-time Electricity Commissioners

FOLLOWING the passing of the Chartered and Other Bodies (Temporary Provisions) Act, 1939, an Order has been made reducing the number of Electricity Commissioners who are required to be whole-time officers to two; the Electricity (Supply) Act, 1919, provided that three of them should be. This arrangement is, of course, to provide for the continuance of Sir Cyril Hurcomb as chairman while he also acts as Director-General of the Ministry of Shipping. The idea is widely held that Sir Cyril's new post is likely to absorb the whole of his energies but the Government thinks otherwise. We have no doubt that Messrs. J. M. Kennedy and C. G. Morley New are capable of carrying on but we do not feel happy at any minimisation of the importance of the Commissioners' job such as is implied by this Order.

Praise for the Grid

THE British grid system, or at least the idea behind it, is receiving close attention in the United States at the present time. President Roosevelt recently said that it was unnecessary to include new steam plants in the national defence power programme unless the United States actually became involved in a war. He considered that the objects could be met by the interlinking of existing power systems, and suggested that the public utilities themselves might carry out such a scheme without Government aid except perhaps in the way of certain loans. Mr. Frank McLaughlin, president of the Puget Sound Power & Light Co., recently paid a visit to this country to study the grid, and has expressed the view that such a system would solve the problem of disposing of the vast amount of power which will be available soon from the Bonneville and Grand Coulee Dams in the North-West of the States. The *Electrical World* quotes Mr. McLaughlin as saying:—" The British grid system is run on sound economic principles for maximum public benefit. It is a splendid example of co-operation between public and private power that produces economies and consumer benefits. Private and public enterprise are preserved, not destroyed. . . . The British Central Electricity Board's policies recognise that it is the people's money which is invested in both public and private power enterprises, and that invested capital is entitled to a fair wage."

Electric Furnace Protection

LAST year saw an increase in the demand for high-frequency induction furnaces, which will no doubt be accelerated in the near future as the need for the special and alloy steels required for national defence becomes greater. It should be remembered that there is a risk of explosion, although possibly an infrequent one, in that a jet of cooling water from a punctured inductor coil may enter the molten steel through a break in the lining. In " Electrical Accidents " for 1937 there was a reference to the progress then being made towards developing automatic electric signals which it was hoped would give sufficient warning to prevent trouble. We are informed by a manufacturer of furnace equipment that the value of earth-leakage protection has been demonstrated during the past few months in the tripping of the relay on a large furnace, although no fault was apparent. When the charge was removed, however, a small tongue of steel was found to have penetrated the lining to within a short distance of the coil. Thus a possibly serious break-through of metal to the coil was avoided.

Worthy of His Hire

A CORRESPONDENT in this issue draws attention to the low rate of wages offered by an electricity supply undertaking for a foreman electrician, not less than thirty years of age, possessing a thorough knowledge of his craft. The advertisers certainly appear to want a good deal for 1s. 6½d. an hour—more than the ordinary electrical contracting firm calls for. The agreed N.F.E.A. rate for journeymen electricians in the area is also 1s. 6½d. per hour, but there is, in addition, a cost-of-living bonus of 5s. 10d. a week. This seems to be another case for the Association of Supervising Electrical Engineers to look into.

Glass Insulation

ONE of the more important electrical developments of the past year has been the use of glass fibre as Class B insulation for motors. Previously the difficulty had been to obtain a suitable varnish for filling the interstices of the weave. Whereas the varnishes available were more than able to withstand heat that was enough to destroy a fabric base, *e.g.*, cotton, they would quickly perish at the high temperatures at which a glass base was unaffected. New varnishes have been evolved, however, which tests have shown to be fully equal to the heavy duty that justifies the additional cost of glass and not to deteriorate with age. Large AC motors have already been built on these lines for voltages up to 6.6 kV. Additional advantages of the new insulation are that it is acid resisting and permits a smaller frame of motor to be used in some circumstances. Other aspects are discussed in an article appearing in this issue.

Resolutions

IN this first issue of the New Year we extend our best wishes to all our readers at home and abroad and renew our resolve to continue to keep them posted week by week with the latest news of activities in all branches of the electrical industry. We hope that for their part readers will assist those who produce and distribute the ELECTRICAL REVIEW, and at the same time guard against disappointment, by asking their newsagents to arrange for the regular delivery of this journal. As we have already pointed out, much paper and trouble can be saved by this means—a very important consideration at the present time.

GRANITE QUARRYING

Electrical Methods at Penmaenmawr

ANYONE who knew Penmaenmawr in North Wales twenty-five years ago would notice a big difference in its appearance to-day. Actually, 100 ft. of the summit of the mountain has disappeared completely, and only a small portion of another 100 ft. remains; within the next two years or so this will have gone too. This remarkable change in geographical features is due to the operations of the Penmaenmawr & Welsh Granite Co., Ltd., which is now producing crushed granite at the rate of 3,000 to 4,000 tons a day, the maximum output achieved being 800,000 tons per annum (apart from the sett manufacture), though there would be no difficulty if required in increasing this amount. This material is used for road-making, building works, &c.

To achieve this output, the works have been completely electrified, and nothing is done manually that can be done better by mechanical means. In fact, there are now no fewer than 200 electric motors installed (the largest 400 HP), representing a total of 4,000 HP, and every year about 4½ million kWh of electrical energy is consumed, the maximum demand being in the neighbourhood of 1,500 kVA.

Provided by the North Wales Power Co., Ltd., by means of overhead lines from Dolgarrog, a 20-kV 3-phase AC supply is transformed to 2,000 V and 500 V at four sub-stations, situated at four points in the quarries. The 2,000-V supply is required for excavators, primary mills, compressors, winches, &c., the lower voltage being used for secondary mills, screens, conveyors, &c. Subsidiary transformers give 100 V for lighting and 25 V for handlamps.

" Bucyrus-Erie " 4-cu. yd. excavator loading rock into skips. A general view of Penmaenmawr and the quarries is seen at the top of the page, Pendinas on the right and Penmarian on the left

No. 1 sub-station, which feeds the Penmarian mill and the Graiglwyd quarry, is equipped with one 500-kVA and two 400-kVA transformers, one of the latter being used as a spare. No. 2 sub-station, serving the extensive maintenance shops at Braichllwyd and the Graiglwyd Pier, has duplicate 500-kVA units (one as a spare), while No. 3 sub-station, supplying the Penmaen Mill, Penmaen Pier and the East Quarry, has two 750-kVA units (one as a spare).

The excavator, primary crusher, compressor, &c., at the Kimberley Bank and also the winch for hauling up machinery are served by No. 4 sub-station, which has a double roof as a protection against falling stones and is equipped with duplicate 1,000-kVA transformers. These are English Electric apparatus, those previously mentioned being of Metrovick construction. In preparation for future extensions, a space has been provided at the No. 4 sub-station for a third transformer: as a cable trench has been constructed and a rail track has been brought to the doors of the sub-station, installation should present no difficulties. All the sub-station gear is provided with overload and earth leakage protection, and to enable tests of earth plates to be made, a special panel has been installed.

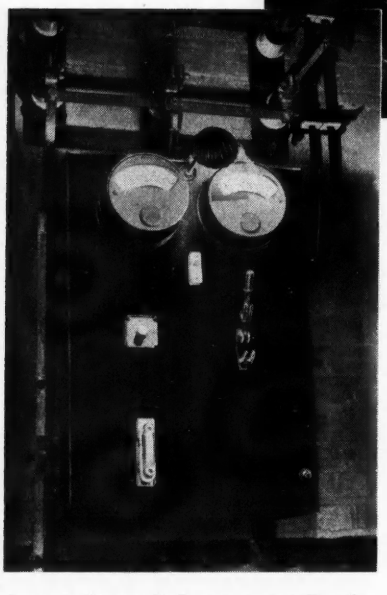
Throughout the works, mechanical production is based on an output of 200 to 250 tons per hour. Blasting, the first operation, is carried out four times a day, small blasts bringing down 1,000 to 3,000 tons at a time being found most satisfactory. The drilling machines are operated by compressors delivering air at a pressure of 80 lb. per sq. in. The largest of these compressors, which serves the Kimberley Bank, where work is at

present centred, is a 1,750 cu. ft. per minute Chicago Pneumatic Tool Co.'s machine operated by a 325-HP, 485-RPM Lancashire Dynamo motor. This is equipped with an Allen West liquid starter and a belt drive, an additional small belt from the driving shaft operating a pump for cooling the compressor.

Two smaller Ingersoll-Rand compressors, used in other parts of the quarry, have 1,200 and 880 cu. ft. capacities, and are driven by a 200-HP, 323-RPM Sandycroft motor and a 170-HP, 720-RPM Lancashire Dynamo motor respectively. For sharpening drills and other small jobs when the larger machines are not working, there is a further small 280 cu. ft. per minute Ingersoll-Rand compressor driven by a 50-HP, 720-RPM. Mather & Platt motor.

Right: One of the tapping points for the excavator. Note the strips of Balata belting round the cable to give additional protection. Below: Ellison 500-A gate-end switch for connecting the travelling crane to the ring main

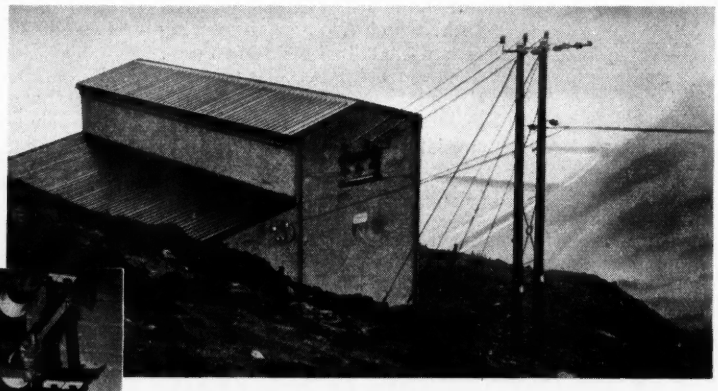
After blasting, the granite is loaded by means of a "Bucyrus Erie" 4-cu. yd. (about 5 tons) excavator, direct into side-tipping skips, each of which holds approximately 7 tons. The excavator is electrically operated and has American General Electric motors and generators, totalling 400 HP. Separate motors are used for hoisting swing and crowd, a Ward-Leonard system giving accurate control of all operations. Supplying the excavator is a 2,000-V ring main which is laid round the top of the mountain, six tapping points being equipped with special 100-A capacity switchgear specially designed by George Ellison, Ltd., in collaboration with the granite company. This switchgear is fitted with draw-out plugs.



The circuit-breaker at the "off" position earths all cores of the trailing cable, while the no-volt trip and non-close hook prevent the breaker from being closed unless the pilot circuit is completed. The pins in the plug are equal in length, but the socket in the plug receptacle to which the pilot core is connected is shorter than those to which the main cores are connected. This ensures that on plugging in the main pins are well home before the pilot pin enters and the pilot pin breaks first on withdrawing the plug.

By this means, making or breaking circuit at the main pins and sockets is prevented, and the return path by the armouring for the pilot circuit ensures that the load is always earthed. The pilot circuit is energised at 110 V by a voltage transformer. The plug at the load end of the trailing cable cannot be inserted in the receptacle at the circuit-breaker, or *vice versa*. The trailing cable, which was designed by W. T. Glover & Co., Ltd., is 4-core, cracore web, double wire armoured (8 gauge), and is protected from severe physical conditions under which it is working by having strips of rubber or Balata belting placed loosely round the outside. For a 7-ton Smith travelling crane operating at 500 V, George Ellison 500-A, gate-end switches are provided at intervals round the bank.

The full skips in trains of about eight are taken by means of Diesel locomotives to the head of the primary crusher at Pendinas. Here, an ingenious tipper (designed by the company's own staff) comprising a 15-HP, 720-RPM electric motor, reduction gear pulleys, cam and a long hooked arm, catches hold of a bar on the back of the skip and tips the contents forward into the crusher.

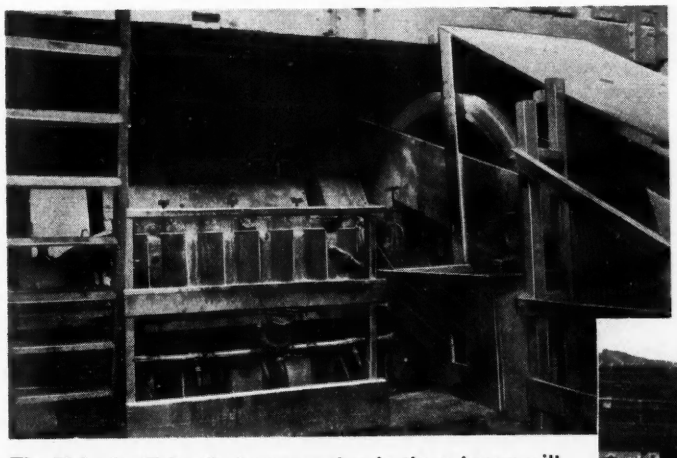


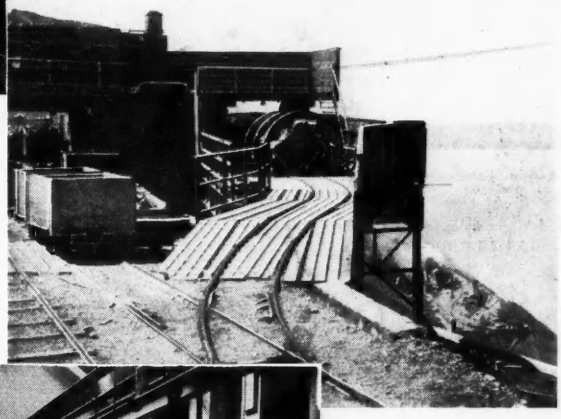
No. 4 sub-station with double roof as a protection against falling rock and (left) a special panel for testing earth plates

Before crushing, the pieces of granite may be anything up to 5 tons in weight, and to control the flow of stone into the crusher a Ross feeder is used, consisting of a curtain of heavy chains. The crusher, a 56-in. by 72-in. Buchanan machine, which is driven by a 2,000-V, 400-HP, 585-RPM Lancashire Dynamo slip-ring motor through Dawson rubber vee belts (40 HP per belt), reduces the stone to pieces approximately 10 to 12in. The weight of the crusher is no less than 140 tons, and to withstand the enormous strain placed on them the side frames alone weigh 27 tons. Water cooling for the main bearings is provided by an electrically operated pump, while a mechanically operated pump

forces grease to the pitman and frame bearings and to the toggle bearings.

From the crusher the stone is carried by a 42-in. troughed conveyor belt to the "Mogul Gyrex" screen. Here the small granite and dirt are removed and taken

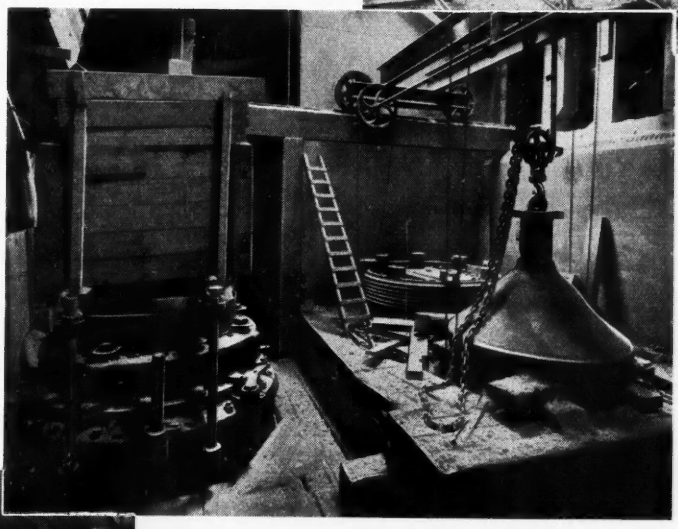


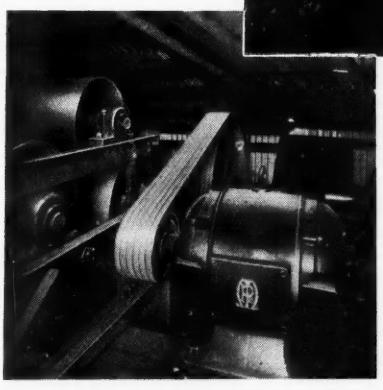


The 56 in. by 72 in. Buchanan crusher in the primary mill and (right) the electrically operated tippler at the head of the secondary mill

to a "Traylor" screen supplied by Thomas Locker & Co. This screen is operated by magnets on either side, the necessary 15-V DC supply being provided by an American G.E. motor-generator; the 500-V AC supply is also utilised to obtain the 3,000 per minute vibration required. From here the granite is removed and returned to the main stream, while the dirt is conveyed to a dirt tip. The main flow from this "Mogul" screen is conveyed to a hopper or dump (capacity about 600 tons) to await removal to the secondary mill.

In the crusher switchroom the 2,000-V supply from the No. 4 sub-station is taken by means of two circuit-breakers, one controlling the supply to the crusher motor and the other to a 300-kVA Crompton





One of the Symons cone crushers in the secondary mill and (left) a 50 HP Mather & Platt motor driving three pier conveyors

Parkinson transformer, which provides a 500-V supply for the other machinery. A liquid starter is provided for the crusher motor, and there are other smaller circuit-breakers to control the tippler, Ross feeder, crane, pumps, conveyors, screens, &c., and also a 20-kVA transformer of Crompton Parkinson manufacture which further steps down the supply to 100 V for lighting; 25-V transformers are installed for hand-lamps. All the switchgear and the starter mentioned were supplied by Allen West & Co., Ltd.

The first crushing operation completed, the rock goes from the dump *via* a pan-feeder directly into 3-ft. gauge trucks holding about 3 tons each. These trucks are lowered down two gravity-operated inclines. Then they are formed into trains of about sixteen trucks, and are hauled by an Armstrong Saurer Diesel locomotive a distance of ¾ mile to the secondary mill at Penmarian. Here, after being weighed, the trucks are run two at a time into a specially designed electrically operated tippler. This tippler is equipped with a special wagon stop which permits three axles to pass and hold the fourth, thus locking the trucks into position. The tippler is driven by a 7½-HP motor by means of a vee belt and reduction gear. A contactor starter is installed, together with knock-on and knock-off switches. When a lever releasing the tippler is pulled, the knock-on switch sets the tippler revolving and automatically the knock-off switch brings the tippler to rest after completing the revolution.

In the secondary mill the stone is further reduced, sizes between 1½ in. and sand being obtainable. First, the material is fed through a Ross feeder to a 20-in. "Traylor" gyratory crusher driven by a 200-HP, 323-RPM Lancashire Dynamo motor. This crusher reduces the granite down to 4 to 4½ in., and it is then conveyed past a Kramer 56-in. magnet which removes any tramp iron. This magnet is operated from a 110-V DC supply obtained from a motor-generator set, the motor being a 15-HP Parkinson unit running at 750 RPM and driving a W. H. Allen generator.

The stone is conveyed to grizzly rolls for sorting, the oversize being returned for recrushing, while the main stream advances to a series of four Symons cone crushers. The largest of these is a 5½-ft. machine, driven by a 300-HP, 485-RPM Lancashire Dynamo motor, the others being a 4-ft. and two 3-ft. with respectively 200-HP, 323-RPM Sandycroft; 80-HP, 485-RPM Sandycroft; and 75-HP, 700-RPM B.T.H. motors. Conveniently situated in the mill is a bank of iron-clad switchgear controlling all the motors. George Ellison & Westinghouse main circuit-breakers control all the large motors, while Parmiter, Hope & Sugden

gear is used for the small units. The screening in the mill is carried out by means of a series of double-deck "Traylor" screens as already described and two Symons type screens for very fine work.

Altogether, there are sixteen conveyors operating in the secondary mill and nine in the screening plant and these, like those in other parts of the works, are driven through reduction gears by means of individual electric motors (generally 7½-HP, 720-RPM), Lancashire Dynamo, Mather & Platt, and Laurence, Scott being the suppliers. From the mill the stone is conveyed to the screen house, where it is screened by means of double-deck "Traylor" machines, and then deposited by means of conveyors in the respective large storage hoppers: Ellison switchgear is used throughout.

From the storage hoppers, the stone is discharged into trucks and then lowered to hoppers at the Graiglwyd Quay. Here the material can be loaded direct into railway wagons, or alternatively, discharged by means of conveyors for transport by sea. Eight conveyors 36 in. wide and travelling at the high speed of 450 ft. per minute are used for this purpose, and in order to be able to discharge into ships at any state of the tide, one of them is movable and has a travel of 150 ft. Four of these conveyors are driven by 7½-HP Laurence, Scott motors, three by one 50-HP Mather & Platt motor, and the moving conveyor by a 25-HP Mather & Platt machine. An automatic weighing machine supplied by the Westminster Weighing Machine Co., Ltd., on the centre conveyor is capable of weighing up to 700 tons per hour and has an accuracy of 99 per cent.

The moving conveyor is raised or lowered on wheels up and down the pier by means of a helical geared winch driven by a 6-HP, 550-RPM Lancashire Dynamo motor. This plant is operated through Mavor & Coulson switchgear. Glover's trailing cables are used for the moving conveyor, lighting and telephones.

Most of the stone now being worked comes from what is known as the Kimberley Bank. On this bank there remains about 1¾ million tons of granite to be moved, after which operations will be carried out 100 ft. lower. The material here will, it is anticipated, be sufficient to meet requirements for approximately twenty years. Foundations for a crushing plant with twice the capacity of the existing one have been built.

As some parts of the machinery weigh as much as 26 tons, getting them up the side of the mountain to their final position approximately 1,200 ft. above sea level is no mean task. For this purpose, a special haulage system has been provided with a rail track and is operated by a 2,000-V, 120-HP, 485-RPM Sandycroft motor with Westinghouse control gear, reversing switch and belt drive for speed regulation. Situated in the same building as the winch is the control gear with earth leakage relays (Allen West) for the excavator. Close to the site of the new primary mills are well equipped maintenance and repair shops.

We have to thank the directors of the company for allowing us to visit the works, and for their help in compiling this article. We also acknowledge with thanks the permission of *Mine and Quarry Engineering* to reproduce the photographs of the crushing plant.

Power Station Staffs' Salaries

Increase from January 1st

As we briefly mentioned in our last issue, the rise in the cost of living during the past six months has necessitated the upward adjustment of power station engineers' salaries as from January 1st. According to existing provisions the new rates will remain in force until June 30th.

The figures in the revised schedule issued by the National Joint Board of Employers and Members of Staff are given in the accompanying table. The letters appearing in each class show (a) the salary for the first two years of service; (b) for the next two years; and (c) after four years' service. Certain of the grades bear definite descriptions:—Grade 1 is deputy chief official; 3, power station superintendent or mains superintendent (with charge of sub-stations); 4, mains superintendent (without charge of sub-stations); 8, shift charge engineer; 8b, sub-station charge engineer; and 9a, switchboard attendant.

The variations, additions and amendments provided for in the 1923 agreement remain in force. For instance, employees in the London area are entitled to an addition of 5 per cent., and in any district where conditions justify lower remuneration a deduction of 5 per cent. on the schedule rates can be made by agreement.

SCHEDULE OF SALARIES

(Capacity or maximum demand in kW.)

Grade		1	2	3	4	5	6	7	8	8a	8b	9	9a	10	10a	10b	10c	11	11a	11b
		£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Class A 1,000–2,000	a	480	416	374	320	302	273	246	246	228	212	—	—	—	—	—	—	—	—	—
	b	492	426	383	332	311	284	255	250	232	214	—	—	—	—	—	—	—	—	—
	c	504	436	392	343	318	293	264	255	235	218	—	—	—	—	—	—	—	—	—
Class B 2,001–4,000	a	515	446	401	355	327	304	273	260	239	221	—	—	—	—	—	—	—	—	—
	b	531	460	414	362	337	311	284	264	243	223	—	—	—	—	—	—	—	—	—
	c	548	475	429	371	348	318	293	268	246	227	—	—	—	—	—	—	—	—	—
Class C 4,001–6,000	a	564	489	442	379	359	325	304	273	250	231	212	—	—	—	—	—	—	—	—
	b	575	499	450	390	365	335	310	282	258	237	217	—	—	—	—	—	—	—	—
	c	584	507	458	403	373	345	314	290	265	243	222	—	—	—	—	—	—	—	—
Class D 6,001–8,000	a	595	517	466	414	380	355	320	299	273	249	227	212	—	—	—	—	—	—	—
	b	609	531	480	426	390	360	329	304	279	254	233	217	—	—	—	—	—	—	—
	c	624	545	492	436	400	367	338	310	285	261	239	223	—	—	—	—	—	—	—
Class E 8,001–13,000	a	—	559	505	448	410	373	347	314	290	266	244	228	212	—	—	—	—	—	—
	b	—	574	512	455	421	383	356	323	298	274	250	231	213	—	—	—	—	—	—
	c	—	588	519	460	432	393	365	332	307	282	258	234	215	—	—	—	—	—	—
Class F 13,001–25,000	a	—	—	526	467	443	403	374	340	314	289	264	237	218	—	—	—	—	—	—
	b	—	—	538	483	449	412	379	348	322	296	271	242	219	—	—	—	—	—	—
	c	—	—	552	500	456	421	384	356	329	303	277	246	221	—	—	—	—	—	—
Class G 25,001–50,000	a	—	—	564	516	461	431	388	363	336	310	284	251	223	212	—	—	—	—	—
	b	—	—	578	528	477	440	402	368	341	315	290	258	228	217	—	—	—	—	—
	c	—	—	593	539	491	450	415	372	347	322	297	264	234	222	—	—	—	—	—
Class H 50,001–100,000	a	—	—	607	551	506	459	429	377	352	328	304	270	239	227	212	—	—	—	—
	b	—	—	627	565	516	474	436	388	362	336	311	278	245	233	217	—	—	—	—
	c	—	—	648	580	527	488	445	401	372	345	318	285	253	238	222	—	—	—	—
Class J 100,001–150,000	a	—	—	667	595	536	503	453	412	383	354	325	292	261	244	227	212	—	—	—
	b	—	—	684	610	551	516	465	424	393	363	334	301	268	249	233	217	—	—	—
	c	—	—	701	626	565	529	477	434	404	373	343	309	275	257	239	223	—	—	—
Class K 150,001–200,000	a	—	—	720	642	579	543	489	446	414	383	352	317	283	264	244	228	212	—	—
	b	—	—	739	659	595	557	503	458	426	393	361	326	290	271	249	234	217	—	—
	c	—	—	757	675	610	572	515	470	436	404	371	335	299	279	257	239	223	—	—
Class L 200,001–250,000	a	—	—	776	693	625	586	528	482	448	414	381	344	307	286	264	244	228	212	—
	b	—	—	796	711	642	601	543	495	460	426	391	354	315	293	271	250	234	217	—
	c	—	—	816	729	658	617	556	508	472	436	402	363	324	302	279	258	239	223	—
Class M Over 250,000		—	—	837	747	675	633	571	521	484	448	412	373	333	310	286	264	244	228	212

PULVERISED-FUEL DEVELOPMENTS

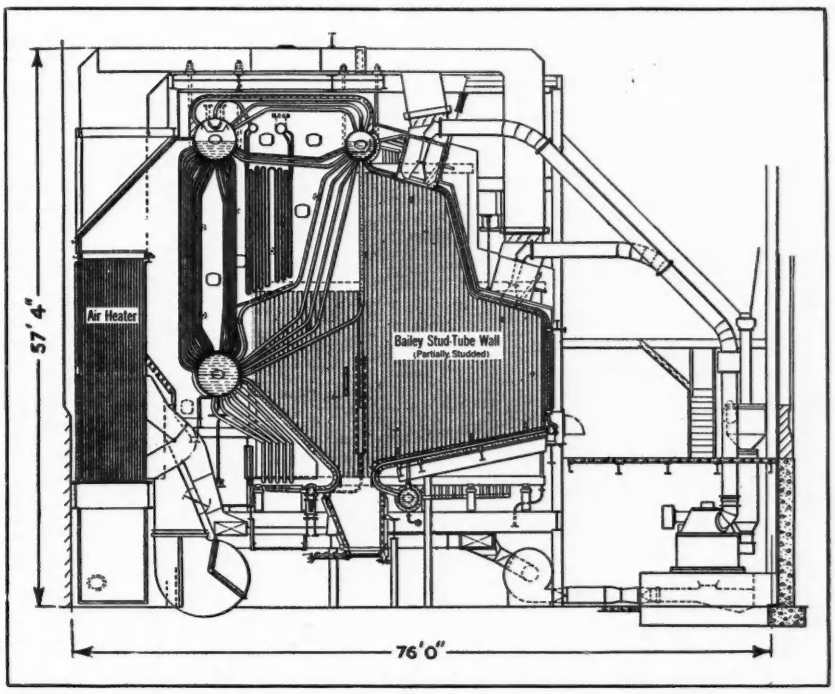
An Investigation into Present-day Furnace Practice

By V. Walker, A.M.I.E.E.

DATA collected by the Prime Movers' Committee from various operating companies in the United States indicate that there are no clearly defined fundamentals in respect of pulverised-fuel furnace design, particularly as regards rates of heat release, effect of ash-fusion temperature and the selection of slag-tap and dry-bottom furnaces. Dry-bottom furnaces have, in general, been associated with high-fusion temperature ash and the slag-tap or wet-bottom with low fusion temperatures, although their relationships are sometimes completely reversed. For instance, a number of new installations are being equipped with dry-bottom furnaces to burn coals having ash-fusion temperatures as low as 1,900 deg. F. In the opposite direction a number of wet bottom units handle ash having a fusion temperature of 2,600 deg. F. and higher.

The choice between molten- and dry-ash removal furnaces is largely influenced by local conditions in respect of removal facilities, handling and disposal of ash or slag material. For example, one station finds that the ash from dry-bottom furnaces is simpler to handle and can be disposed of at lower cost, whereas in another case the wet-bottom units are preferred because the ash handling cost is lower and the clinker is saleable. In general, wet-bottom furnaces are favoured for base-load operation. With the dry-bottom furnace the boilers are generally quicker in response to varying load characteristics due to the absence of the large heat storage associated with the molten type of furnace.

Continuous slag discharge is superseding the older intermittent system, as it avoids the troublesome accumulation of iron sulphites, and also the hazard of storing the slag. The continuous-drip floor is also favoured in place of continuous tapping through a single opening.



Pulverised fuel fired tri-drum Stirling boiler with modified two-stage drip furnace

Results of operation with the various types of furnaces do not give any indication as to how high rates of heat release may go in the future. The two-stage slag-tap design extends to 43,800 BThU per cu. ft. per hr., while the open-pass unit, as illustrated in the ELECTRICAL REVIEW of July 15th, 1938, has a maximum of 52,000 BThU. The maximum heat release of the majority of furnaces does not, however, exceed 30,000 BThU.

The maintenance of clean furnace walls has become a matter of increasing concern. Since for high steam temperatures the superheater must be located in zones of high gas temperatures, a slight amount of slag on the furnace wall will raise the temperature of the gases to a point at which slag accumulations may occur on the convection surfaces.

Slag Deposits

In some cases the steam temperature is very sensitive to slag accumulations, and retractable slag cleaners, using saturated steam, are being tried. Light spongy ash and slag often accumulate on the furnace walls and there is little difference in the character of the slag deposited with either vertically or tangentially fired furnaces. The heaviest deposits with down firing occur on the rear wall, whereas with tangential firing the deposits are spread uniformly around all sides for some distance above the burners. When burning river-bottom anthracite coal no slag forms on the furnace walls or boiler tubes. A light sintered deposit attaches itself to refractories without deep penetration.

Tube fouling and slagging may be minimised by providing a large furnace of moderate heat release and maintaining the temperature of the gases leaving the furnace, so that the ash particles in suspension leave the furnace in a chilled and solidified condition. The larger the unit the more difficult it is to provide sufficient cooling surface to minimise slagging, since as the size of the furnace is increased the amount of radiant heating surface per cu. ft. of furnace volume that it is possible to install is halved each time the cross-sectional dimensions are doubled.

In very large units it often becomes impracticable to install sufficient cooling surface to reduce the temperature of the gases at the furnace outlet below fusion temperature when this is very low. Fortunately, it is not necessary to cool the gases to this extent. Small ash particles resulting from the burning of pulverised coal of high fineness suspended in a clear furnace gas and passing sufficient radiant heat-absorbing surface will be chilled so that at least the crust will be solid. A particle or particles agglomeration, which will pass a 50-mesh screen, may be as much as 500 to 800 deg. F. cooler than the surrounding gases.

Modified Stirling Design

The pulverised-fuel fired tri-drum Stirling boiler with modified two-stage drip furnace illustrated has a capacity of 300,000 lb. per hr., with steam conditions of 900 lb. per sq. in. and 825 deg. F. The furnace consists of a bare-block hopper and first-stage floor, partially studded tube side walls in both stages and a first stage uptake wall of fully and partly tube construction. The lower part of the furnace slag screen is of bare tubes bent outwardly to meet vertical headers outside the side walls.

The burners of the furnace are placed on arches at different elevations to adapt the unit to coals of different ash-fusion temperature. The lower burner is used with coals having a low ash-fusion temperature, thus increasing the temperature of the furnace floor, and so liquifying the ash so that it drips into the sluice. When using high ash-fusion temperature coal and at lower ratings with coals having a low-fusion temperature, the upper burner will be used, the ash being then removed in the dry state.

A new Babcock & Wilcox pulveriser, Type E, differs from other pulverisers of the same make, mainly in the use of a bottom drive, rotating bottom ring, stationary top ring, and stationary pressure spring assembly. Its power consumption (only 9 kWh per ton) is 30 per cent. less than that of the

similar type B ball mill. Raw coal is fed to the inside of the upper grinding ring and aided by centrifugal force works outwards between the grinding balls. Preheated air, passing through a throat between the grinding elements and the housing, picks up the ground-coal particles and dries them as it carries them upwards to the classifier, whence over-size particles are returned to the grinding zone. Fineness of the coal is regulated by the air flow through the mill.

In the former Hardinge conical ball mill, air was introduced at one end of the mill and pulverised fuel removed at the other. A later design introduced air and removed pulverised coal at both ends simultaneously, raw coal being fed at one end only. One exhauster dealt with the two streams of pulverised coal.

Greater flexibility has now been attained by using a separate coal feeder and a separate exhauster for each end of the mill, hot air being introduced at both ends. Each exhauster supplies separate distributors and burners. A large proportion of the load can be carried with one exhauster out of commission; also at low ratings some saving in power can be realised.

A number of furnaces of the large high-pressure units employ tangential firing, which until quite recently has not been employed for burning gas and oil. Where vertical firing is used the multiple intertube type of burner appears to find favour. At Port Washington Station, Milwaukee, the average heat rate in the second year of operation was reduced to 10,835 BThU per kWh, with an availability of 88.7 per cent. Very rapid corrosion of the screen floor tubes in the absence of oxygen was found to be due to electrolytic action, but a neutral protective film in the interior of the tubes, guided by hydrogen measurements, has apparently been successful in correcting the trouble.

Four of the high-pressure boilers at the Edgar Street station of the Boston Edison Co. are to be converted to pulverised fuel from retort stokers and fitted with additional side-wall cooling surface of partly stud construction. This was the first commercial 1,200 lb. per sq. in. installation in the world, the first units being put in in 1926.

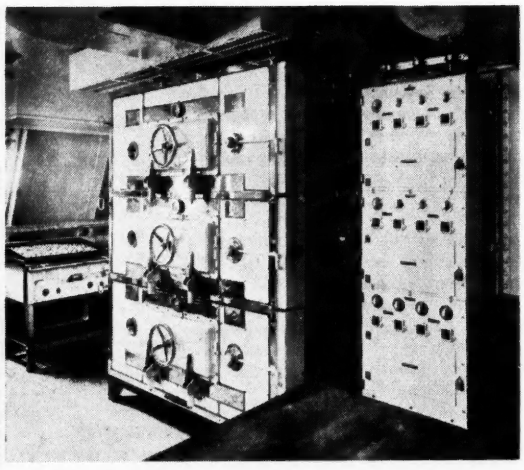
In American practice it would appear that for capacities of 150,000 lb. and over pulverised-fuel systems are generally lower in first cost than stoker equipped boilers, due not only to lower equipment cost but also to lower building costs. This is borne out to some extent by the preponderance of pulverised-fuel units installed in the last few years, although many other factors enter into the selection.

British Plant for Dutch Ship

Large Fluorescent Lighting Installation

ELECTRICAL equipment of many different kinds for lighting, automatic telephones, galley equipment, and other services was supplied by the General Electric Co., Ltd., for the m.v. "Oranje" (21,000 tons), which is owned by the Netherlands Steamship Co., of Amsterdam. She has accommodation for 700 passengers and in trials attained a speed of 26 knots per hour.

One of the principal features is the installation of 1,400 ft. of "Osira" fluorescent tubing, said to be the largest and most ambitious installation of its kind afloat, in the social hall where the lighting is entirely indirect. Three-colour (red, green and blue) fluorescent tubes form three main ceiling cornices over the central part of the room, which may be used as a dance floor, and a number of smaller ceiling recesses of lower height are in the wings of the room.



Left: First-class social hall of the M.V. "Oranje" showing the effect of indirect lighting by "Osira" fluorescent tubing. Right: G.E.C. three-tier baking oven

The verandah dance space on the promenade deck has a number of special bowl fittings, each containing one white and three pairs of coloured lamps, controlled by G.E.C. negative booster dimmer equipment. This enables the white light to be dimmed or raised while the red, blue and amber can be controlled to provide an infinite variety of fixed colour effects or a constantly changing colour cyclorama. The booster set is driven by a squirrel-cage motor at constant speed. Motor driven potentiometer regulators in the booster fields, together with a number of small contactors, control the intensity of each colour circuit.

The G.E.C. also supplied seven 18 in., 220 V, DC exhaust fans and silent running three-phase ceiling fans for the public rooms, these being 35 "Malakand" fans with 152 cm. sweep blades, and 72 "Kingsway Junior" fans with 90 cm. sweep blades. There are two private automatic telephone exchanges installed by the same company.

All circuit-breakers (28) on the main switchboard are of the G.E.C. line contact type, electrically operated with alternative arrangements for manual operation, both AC and DC breakers being fitted with overload relays, no-volt and shunt trips, according to the requirements of each circuit. The main generator circuit-breakers, of which there are five, are each triple-pole, the centre pole being used as an equaliser; these are arranged to close first and open last. Each generator circuit-breaker has a capacity of 5,000 A and is fitted with overload and reverse current relays.

The luminous call system has 850 call points. All of the pushes and resetting units are recessed behind cream "Roanoid" front plates; approximately 90 section and master indicators are fitted, while special relay cabinets are recessed behind the panelling in the vestibules.

The G.E.C. secured the order for a portion of the galley gear in face of Continental competition, including a combined single oven range and hotcupboard, one three-tier baking oven and a number of water boilers ranging from 3 to 15 gallons. The single oven range is of novel design which has a hot-plate area equivalent to that of a double-oven range. The oven itself is placed to one side, and the spare space available under the remainder of the hob is utilised as a hot-cupboard. Tubular elements in the oven, which measures 26 by 26½ by 18 in. are arranged for side and bottom heat, the oven loading being 4.8 kW. These hot-plates are of the marine waterproof type with refractory embedded elements. The total loading including oven, hot-cupboard, and hot-plates is 34 kW. The three-tier baking oven has steam-tight tubular elements with a total loading of 45 kW.

Pirelli-General cambric and rubber cable, special reflectors for verandah lighting standards, low voltage miniature spotlights complete with transformers for special lighting effects, watertight prismatic bulkhead fittings, 850 flush type bell pushes and 2,000 silent "Landor" switches of various types and in varying finishes were also supplied.

GLASS INSULATION

Advantages and Limitations

By Microfarad

THE recent introduction of glass in fibre form as an insulator marks an important advance in insulation technique and one which is likely to have considerable effect on electric motor design and manufacturing practice in the future, particularly in regard to the heavy-duty type of machine in which class B insulation (mica and asbestos) is at present largely used.

Glass was one of the earliest insulating materials to be used but in its ordinary brittle form it was of little value in electrical machinery. It has also been manufactured in fibre form (glass silk) for many years and largely used for heat insulation, but it is only within the last two years or so that the production of alkali-free glass in sufficiently fine fibres for electrical purposes has been possible. Ordinary soda glass is liable to be affected to a small degree by water and is therefore unsuitable for electrical applications.

Two types of glass fibre are being produced—one known as "staple fibre," in which the fibres are comparatively short (8 to 15 in. long) and about 0.00025 in. in diameter, and the other as "continuous fibre" which may be as small as 0.0002 in. in diameter and is drawn in continuous lengths.

Glass insulation is available as wire covering, tape for coils, cloth for slot insulation, slot-wedge material and sleeving for conductors. Cord for tying is also available, or the smaller sizes of tubing can be used for the purpose. Glass has a number of advantages over the existing insulating materials, and some disadvantages. Its rather different character also calls for modifications in machine design.

The principal advantage of glass is its resistance to extreme heat without undue deterioration of its insulating and other properties. The limit of safe operating temperature of materials at present used has been set by the temperature of failure of the cotton or other base. The failing point of the insulation varnish with which the base material is impregnated has up to the present been much higher than that of the base.

Varnish the Limiting Factor

Being non-inflammable, glass throws the limiting factor of safety on the insulation varnish. The safe temperature limit of varnishes used hitherto has been in the neighbourhood of 140 deg. C. and varnish manufacturers are now experimenting with qualities which will withstand higher temperatures without failure, but considerable time must elapse before test results of motors in service become available.

Glass has very high tensile strength and is stronger than textile fabrics of similar size. Continuous-fibre glass is stronger than staple fibre, but the latter is quite suitable for applications where high tensile strength is not required. Continuous-fibre glass is invariably used for wire covering. One advantage of glass insulation over fabric—apart from any considerations of higher operating temperature, is that better space factor in the windings is obtained because of the thinner material for the same strength and therefore slightly more output from a given frame for the same temperature rise.

Glass fibre retains its tensile strength under high temperature conditions much better than does asbestos. Cotton is, of course, hygroscopic, some asbestos fabrics have a considerable proportion of hygroscopic material in them, while asbestos itself may contain salts which are conductors in the presence of moisture, and also metallic impurities. Although it is non-hygroscopic, glass in the unimpregnated state may nevertheless be subject to the effect of moisture by condensation (on account of the very small diameter of the fibres a very great surface is exposed) and by capillary action in the spaces between the fibres.

Impregnation Necessary

It is thus necessary always to impregnate the glass insulating material and here again care must be taken to ensure that the varnish chosen will adhere satisfactorily to the glass. Imperfect adhesion of the varnish will cause minute pockets which will set up capillarity. It should be noted, however, that the moisture absorption is much less than with cotton under similar circumstances, and what is important from a service point is that whereas a damp cotton-insulated winding may take a matter of hours to dry out, a glass-insulated winding can be dried out in a very short space of time.

The dielectric strength of plain glass is very high but when it is used in fibrous form the dielectric strength depends on the air or other material in the interstices, and not on the glass itself, so that the dielectric strength of glass differs little from that of other forms of insulating material similarly impregnated at normal temperatures and under normal conditions of humidity.

At high temperatures cotton and similar bases deteriorate whereas glass does not, and although the dielectric strength depends primarily on the impregnant, the non-weakening of the glass base under such conditions is definitely in its favour. Similarly, in humid atmospheres, textiles absorb a certain amount of moisture, however well varnished, and so here again glass is superior.

Although having extremely high strength, glass fibre by its brittle nature is liable to suffer from abrasion and this is its weakest point. To minimise the effect of this weakness all glass material should be impregnated; it should not be bent sharply or brought against sharp edges in the course of manufacture and it should not be used where there is severe or continuous vibration, the effect of which is to break the threads into short pieces.

Higher Thermal Conductivity

In winding, treated wires are smooth running and give no trouble to operator or machine and are not more liable to damage in the process than are other coverings. Cloths and tapes become stiff and difficult to use if completely impregnated and dried before use, and it is often more convenient to impregnate these materials before use but not to dry them off. Experiments are being conducted to find a highly flexible varnish to eliminate this partial pre-treatment. Glass fibre is unaffected by acids (except hydrofluoric), oils and corrosive vapours, and is particularly useful for motors made for working where such conditions are likely to obtain. Glass fibre has a higher thermal conductivity than silk, cotton, asbestos and mica, and will therefore carry off heat more quickly from coils which for the same rating can be made to smaller dimensions than hitherto. The coils must be glass insulated throughout, as the inclusion of any other material would considerably reduce the thermal conductivity.

The principal advantages of glass in machine design are that it permits higher safe working temperatures while the better space factor and higher thermal conductivity permit a greater output from a given frame compared with one insulated with conventional materials. Glass insulation may be adopted to get a small increase of output simply on account of its better space factor than with materials normally used, *i.e.*, it allows more active copper in the slots. The space factor of glass-insulated wire is comparable with that of fine d.c.c.

Increased Power Output

A greatly increased output can be obtained from a given frame—or what is the same, the same output from a smaller frame—by the use of glass insulation at the expense of a higher working temperature, which is, however, not harmful to the insulation. The permissible temperature is limited by the heat which the insulation will withstand, by the maximum safe operating temperature of the bearing lubricant and by stresses set up in the shaft and other parts during heating and cooling. Moreover, it will, I believe, be difficult to convince the majority of users that a small and hot motor is as good and as reliable as a larger and comparatively cool running machine. Glass-insulation materials (including wire) are at present considerably dearer than other materials, and this increased cost must be set against any saving in cost of a smaller machine.

The main line of development at present is the use of glass insulation to increase the reliability of a motor without necessarily any increase of rated output. When a normal motor is badly overloaded it heats up sufficiently to burn the fabric base in the insulation, but a glass-insulated motor will not burn out under these conditions.

Motors with glass insulation can be designed for applications where there is insufficient space for a motor of normal rating. For example, a machine tool may be designed for a standard motor of standard frequency; a lower supply frequency necessitates a large motor for the same output, and it may not be possible to get this in the space allowed in the machine tool frame. Glass insulation, however, may enable the required output to be obtained at the low frequency from the standard frequency frame. Such motors can also be operated at extremely high temperatures or in unusual atmospheric conditions.

RESUSCITATION FROM SHOCK

Why Are Not More Victims Revived?

By Stefan Jellinek

FIRST-AID to a person who is apparently dead from electric shock is made more difficult by the preconceived idea among laymen that electricity acts like a poison or that a certain voltage or amperage will kill a man, so that from the first he considers the case as hopeless.

It is therefore of the utmost importance when giving instruction in first-aid to emphasise that the danger of an electric shock consists not only in the technical factors (e.g., voltage, amperage, kind of current, earth circuit), but also in the bodily and mental condition of the victim at the moment he receives the shock. However alarming the effect of an electric shock may be, recovery must never be regarded as hopeless, as experience gained from thousands of cases with a wide range of amperage has proved.

The author of this article, who was until recently Professor of Electropathology at the University of Vienna and is now engaged in research at Queen's College, Oxford, discusses new methods of artificial respiration.

The question most often asked by doctors and engineers is: What voltage or amperage is fatal? The answer is a paradox: Any amperage or any voltage may, or may not, be fatal. For example, a man in Vienna was killed by DC at the very low voltage of 60, and another in Budapest by only 38 V, whereas in Innsbruck a man was revived who received a shock at 125,000 V.

The personal factor plays a great part. This is demonstrated every day by electricians who in the course of their work intentionally touch conductors charged at voltages that have frequently proved fatal in other cases. There are two reasons to account for this: (1) The electrician is healthy and is equipped, as the generality of people are, with a great tolerance for electricity. (2) His attention is fixed and he is prepared to receive the shock.

The evidence of the foregoing statements is that the majority of victims who have been revived evince no sign of internal injury to the brain or other vital organ, even when a great amperage has passed through the body. We have investigated the case of a victim whose hands had been totally destroyed but who did not faint even though he remained eight or nine minutes in circuit with a current at 2,000 V, showing that the vital organs had escaped injury. It is of paramount importance to the victim whether his attention is focused on the possibility of a shock or whether it takes him by surprise. Preparedness is therefore a protection against shock, the effect of which is usually decided by this factor.*

Electrical Contact While Asleep

We were able to show that it was impossible to kill a deeply anæsthetised animal or cause it severe injury by means of a voltage that would have been fatal if it had been awake. This experiment has been confirmed by accidents occurring among laboratory workers. One man who fell asleep while watching a dynamo touched a bare wire. He was awakened by the contact and by a sensation of burning, but was not shocked or injured.

The explanation of this is that the action of electricity is chiefly functional. It causes a stimulus of such intensity as to paralyse the nerves supplying the vital organs bringing their actions out of gear, *i.e.*, to a deadlock, but the deadlock is reparable. Our assumption that the principal action of electricity is functional was proved by the experience we gained from accidents. Like a relay in mechanics, the function of the brain, heart, lungs and other vital organs did not always cease suddenly but after a varying interval of time or in a manner which was then unknown to pathologists.

Electric shocks may cause fatalities of four different types as follows:—(1) *Exitus momentaneus.*—The victim collapses suddenly. (2) *Exitus retardatus.*—He cries for help and after a few seconds or minutes falls unconscious. (3) *Exitus interruptus.*—The victim collapses suddenly, but after a few seconds gets up, speaks to his co-workers and then falls dead. (4) *Exitus dilatus.*—At first there appears to be no injury and the man may continue working. After an hour or more he may collapse and die suddenly.

An explanation of this may be found by post-mortem examination. In some cases paralysis of the brain was found to have been the cause of death. This indicates that the brain was the first organ to cease action.

In another case death was due to asphyxia or suffocation. In a third the primary cause of death was stoppage of the heart. In some persons there may be a predisposition to sudden death and a post-mortem examination may reveal the sign of it. A less severe trauma even than an electric shock may be the cause of sudden death in such people.

In Austria we were able to convince employers of the necessity of excluding men who on examination were found to suffer from this predisposition from training as practical electrical mechanics. The great majority of post-mortem examinations, and we made five to six hundred, proved that the action of the heart, brain and vessels continued for minutes, in some cases for an hour, even though the doctor during that time was unable to detect any sign of life.

For instance, œdema of the brain or lungs in a man who was known previously to be healthy is definite proof that death was not instantaneous, but that there had been an interval to allow for the development of œdema, the man lying meantime between life and death in the state called suspended animation. A man rescued from drowning after not more than fifteen minutes is in the same state of suspended animation.

Why, if these findings are true, are so few victims of electric shock resuscitated? The reply is that first-aid as now practised is often at fault, treatment not being begun early enough or carried on long enough. As in the resuscitation of a drowning man, time is the important factor. Every second counts. The first few seconds after an accident are decisive, but they are often wasted by transporting the victim, by washing his face or by leaving him alone while a doctor is summoned.

Too Vigorous First Aid

Artificial respiration, as often carried out, is ineffective because the method is applied with too great force, resulting in the lowering or annihilation of the vacuum (negative pressure) in the thorax or even in physical injury. I was able to show by experiments on healthy rabbits, guinea-pigs, dogs and monkeys that artificial respiration applied with too great force might result in sudden death, due not to suffocation but to acute œdema of the brain and lungs.

Both methods of artificial respiration, that of Schäfer used in Great Britain and the United States and that of Sylvester used on the Continent, are founded on the compression of the thorax and have proved very effective.

I have proposed a new method of artificial respiration† which is based not on compression but on an artificial dilation of the thorax, all direct pressure on the thorax being avoided. It is briefly explained by saying that an object such as a rolled-up coat is placed under the back between the shoulder blades, so as to raise the shoulders some inches from the ground. The shoulders are then seized and pushed forcibly backwards to the ground. The action is repeated every four or five seconds. By this manœuvre the spinal column is stretched and the ribs expanded. This causes ventilation of the lungs and induces a suction action of the right side of the heart which improves the circulation.

The position of the patient permits the operator to note the first signs of returning life. A movement of the lips or larynx indicates the return of normal respiration and calls for the immediate cessation of artificial respiration. It is as harmful to continue artificial respiration after this takes place as to give it for too short a time.

This question has given rise to much discussion not only among laymen but also scientists; some say that artificial respiration must be carried on for one hour, others insist on two or three hours. I have always emphasised that the length of time is not a matter for subjective opinions; there are two objective signs which precisely determine the moment for ending artificial respiration: (1) The appearance of signs of returning life, the first being (*deglutition*‡), movement of lips. (2) Certainty of death having occurred proved by the appear-

(*Continued at foot of next page.*)

* "Der elektrische Unfall. Skizziert für Ingenieur und Arzt." S. Jellinek. Third edition. Wien-Leipzig, 1931.

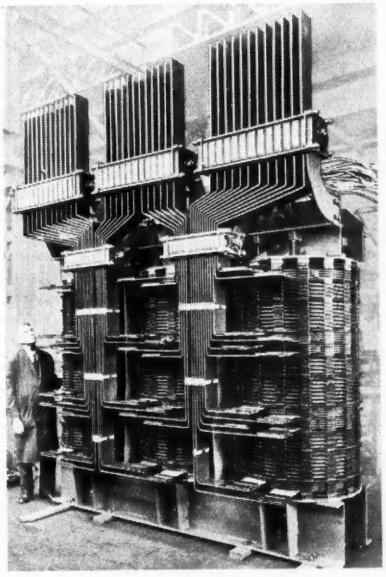
† "Bruxelles-Médical." No. 16, 1935. "Nouvelle méthode de respiration artificielle." La Presse médicale, No. 1, 1938, Paris.

MANUFACTURERS' ACTIVITIES—I

Some Outstanding Orders During 1939

British Thomson-Houston Co., Ltd.

A NOTABLE development in the laboratories of the British Thomson-Houston Co., Ltd., during 1939 has been a discharge lamp without thermal relays having a colour output that is largely independent of the mercury spectrum. Experimental work is being carried out on air and water-cooled projector discharge lamps of very high brightness and lumen output. A steel ignitron is being produced in quantities. Cathode-ray tubes for 4,000 V and over for television have also been evolved. Extensions to the laboratory include completely screened rooms for radio interference measurements and noise analysis.



B.T.H. 7,500-kVA, 33,000/220-82-V transformer for arc furnace duty, showing 19,700-A secondary connections

Insulation research has covered synthetic resins and glass in association with heat resisting varnishes. Fused ceramic resistors consisting of magnesium and titanium oxides have been investigated, and a bonded board material having high insulation resistance, low power factor and good punching qualities has been produced by combining polystrene resin and Cotopa acetylated cotton.

Turning to the heavier engineering products, a large proportion of the contracts received for turbo-alternators are repeat orders. Those now in hand include two 30,000-kW and two 15,000-kW sets for service in this country, an 18,750-kW unit for Brisbane and one of 25,000 for the South African Electricity Supply Commission. These are in addition to sets recently installed of 75,000 and 60,000 kW and lesser outputs, including a 30,000-kW machine operating with steam conditions of 1,200 lb. per sq.in. and 900 deg. F.

Switchgear developments during 1939 include new 33- and 66-kV designs with separable isolated phases, single-break low-oil content breakers and condenser-insulated bus-bars. Total break times of three cycles down to 30 per cent. rating and four cycles at 10 per cent. rating have been accomplished with 33- and 66-kV 1,500 MVA circuit-breakers incorporating self-compensated explosion chambers fitted with contactor-type contacts, high-tensile steel and magnesium-aluminium alloys being used to minimise the weight of moving parts. Pneumatic closing mechanism as well as battery operation is available for these types. Spring closing has also been developed for switches up to 500 MVA, including fractional HP motor and reduction gear.

Air-break gear for 440 to 660 V up to 35 MVA is another line which includes 30- to 400-A iron-clad switch fuses and 400- to 3,000-A breakers. Contracts in hand include metal-clad equipments of up to 750 kVA and 33 kV.

In the transformer department shields have been supplied as standard to the windings of 1,000-kVA units at 66 kV and tests with a recurrent-surge oscillograph show that this method reduces inter-turn and inter-section stresses to one-third of those experienced with unshielded windings. Four 1,000-kVA transformers cooled by "Permitol" (a non-inflammable substitute for transformer oil) have been built for installation in situations involving fire hazard. Transformers for rectifiers and furnaces and in smaller units for discharge lamps, arc-suppression coils up to 812 kVA at 88 V and oil-immersed and cast-in-concrete reactors are also in demand.

Water-cooled steel-tank rectifiers are said to be preferred for converting to 3,000 V, DC, and above, but for lower DC voltages the pumpless air-cooled steel-tank and the glass-bulb types, both of which the company also makes, are in keen competition. Nine pumpless equipments up to 2,000 kW at 630 V and twelve of the water-cooled type for 1,500 kW are now under construction for London railways.

Rectifiers with grid control for arc suppression and compounding have been supplied for voltages up to 3,000 and in capacities up to 2,500 kW for New South Wales and South Africa, and smaller units are under construction. In the glass-bulb class the greatest demand comes from industrial undertakings for units with outputs up to 800 kW at 500 V.

A 3,500-HP, 187-375-RPM DC motor with Ward Leonard control for a sheet and strip mill is perhaps the most striking of the industrial equipment now being manufactured. There are also two winders for China, each driven by a 3,000-HP 54.8-RPM DC motor with Ward Leonard control, one dealing with 260 tons per hour from a depth of about 1,500 ft. and the other 220 tons from 2,100 ft. Further orders include a 1,950-HP 6.6-kV AC equipment for winding from 1,845 ft.

English Electric Co., Ltd.

OF the many orders for steam turbine generating plant received by the English Electric Co., Ltd., within the past twelve months, a 32,000-kW set for initial steam conditions of 1,300 lb. per sq. in. and 950 deg. F. and a 25,000-kW unit for 1,200 lb. and 900 deg. are probably of most interest. Both run at 3,000 R.P.M. and the last-named, in company with a 9,375-kW back-pressure unit is destined for Australia. Contracts are also in course of execution for a number of 30,000-kW turbo-alternators of the same speed (generating at voltages up to 33-kV) but more usual steam conditions and for smaller units for both home and export markets. One of the latter is a 500-kW automatically quick-starting set for emergency use. The most notable of the turbo-alternators completed during the year were two 40,000-kW sets which have the largest output for 3,000 RPM in service in this country.

Research into the suitability of steels (e.g., molybdenum) for high steam conditions has been continuous. By means of equipment in the overspeed pit rotors can be balanced dynamically at full speed with the windings hot and the inherent vibration of discs on solid turbine rotors before and after blading can be tested. Tests on labyrinth packing glands at high temperatures have yielded encouraging results.

Principal contracts in hand in the hydraulic department are

Resuscitation from Shock *(Continued from previous page)*

ance of mortal spots (*livores mortis*). There is a good chance of recovery from shock if some form of first-aid is carried out promptly. The helper on the spot where the accident occurs is responsible for this immediate treatment until the doctor arrives. In some cases the latter may consider that the decisive factor in recovery of the patient is *venesection, lumbar puncture, benzin compresses*§, and other treatment in addition to artificial resuscitation.

There should be a first-aid corps in every factory with practical training in artificial respiration, and knowledge of how to extricate the victim from the electric circuit.

During the last war electrically charged wire or overhead wires liable to be hit by aircraft were the cause of electric shock or fire and many soldiers were killed. The Austrian Ministry of War supplied the troops especially engaged in electro-technics with an "electrosaving-knapsack‖" constructed from my design. These men having had practical instruction in the use of the tools and contents of this knapsack were able to improvise means for saving the victims of electric shock.

Resuscitation from an electric shock may perhaps not be classed among the arts, but it is a handicraft which requires knowledge of technique and practice.

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‡Comptes Rendus, Académie des Sciences, Paris, 1929, Note de S. Jellinek.

§ "Klinik und Histopathologie der elektrischen Verletzungen," S. Jellinek, Leipzig, 1932.

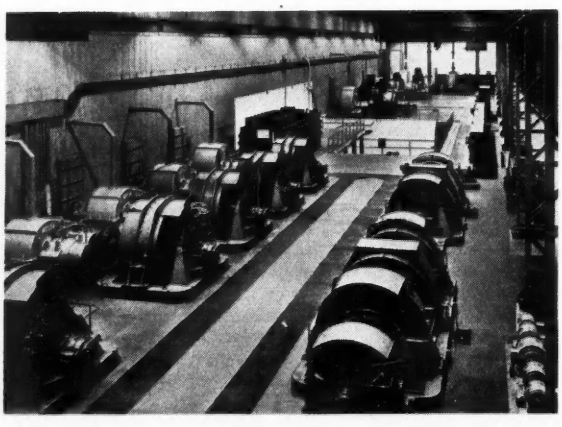
‖ "Elektroschutz in 132 Bildern," S. Jellinek. Deutscher Verlag Wien-Liepzig, 1932. Bundesministerium für Landesverteidigung. Z. Erl, 2900-1936. Telegraphesicherheitsvorschrift Heft 1 ("Das Verhalten beim elektrischen Unfall").

the complete generating plant and penstocks for two new power stations and a surge tower for the Liffey scheme. In one of these, two 250-RPM turbines under a 154-ft. head will drive 18,750-kVA vertical alternators; in the other (operated from the first) will be a vertical-reaction 187.5-RPM turbine under a 55-ft. head driving a 5,000-kVA umbrella-type alternator. When completed a fully automatic 25,000-kVA vertical hydro-electric turbo-alternator running at 300 RPM under a 318-ft. head will have the largest output of any in New Zealand; the runner will be of solid stainless steel. Two 28,000-HP vertical reaction water turbines (360 ft. head) for the same Dominion will be operated by a supervisory control system. The erection of two 23,000-HP turbines and alternators at the Waitaki power station has begun. For Tasmania two 18,750-kVA turbo-alternators under construction are of the horizontal type for a 940-ft. head. During the past summer, the fifth 10,000-kW set was installed at Lochaber power station.

A new development in Diesel production is a range of supercharged engines. Prominent in this department are 350-BHP shunting locomotives for a British railway; their control gear provides constant speed with varying loads. A 3,500-HP Fullagar generating set (a repeat order for Bermuda) is now on test. The chief event on the marine side has been the completion of the passenger vessel *Vecta* which is propelled by two 650-BHP Diesels.

Four rolling-mill installations each requiring about 21,000 HP (peak), two having flywheel motor generators and control gear, have been completed for Australia and India. For home service an outstanding equipment has been a wide-strip hot finishing mill with 10,000 kW of Ward Leonard sets and an eighteen-panel 6.6 kV remote controlled switchboard. A large number of contracts have been received for Ward-Leonard tandem continuous mill drives and reversing and non-reversing drives for hot and cold ferrous and non-ferrous rolling mills. Ward-Leonard sets have also been supplied up to 7,800-HP (peak) and AC equipments have been constructed up to 3,390 HP (peak) at 6.6 kV for winders in various parts of the world.

In the traction field, work in progress includes twelve motor and fourteen trailer coaches for a British railway; the steel bodies are free from mouldings, the panels being welded to the pillars. Twelve 1,500-V motor coaches and twenty driving trailers (a repeat order) were put into service in South Africa. Further Diesel-electric rail cars are on order for Ceylon. New tramcars have been supplied to or are being built for three British municipalities, while orders for trolley-buses have been received from home and overseas. The latter includes one for



Main roughing and finishing mill drives and motor generator sets supplied by the English Electric Co., to a hot wide strip mill

thirty six-wheel vehicles for Johannesburg obtained in conjunction with the Associated Equipment Co.

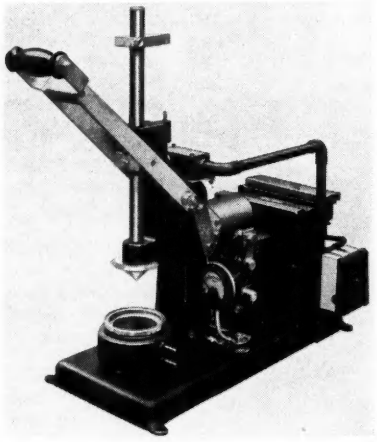
A greater call for large transformers, from 10,000 to 20,000 kVA, is reported. Some 45,000-kVA 88-kV units incorporate on-load tap-changing equipment which is said to be of the highest voltage class yet built in this country. Thirteen large induction regulators for 6.6-kV feeders for Victoria are representative of orders being received for this type of apparatus. AC arc welding equipments (up to 600 A) are much in demand.

Orders for oil switchgear, mainly for medium voltages and rupturing capacities, have been numerous, and the recent opening of the company's short-circuit and impulse testing station has improved testing facilities. One of the chief introductions has, however, been an air circuit-breaker for a maximum rating of 3.3 kV and 100 MVA. There are also new designs of fuse switches for 500 and 200 A and of light fused distribution boards.

The manufacture of pumpless steel-bulb rectifiers represents a new departure, as do also a line of totally enclosed s.c. fan-cooled motors up to 15 HP and a salient pole synchronous induction machine.

Metropolitan-Vickers Electrical Co., Ltd.

ORDERS received for turbo-generating plant by the Metropolitan-Vickers Electrical Co., Ltd., during the past year have involved a capacity higher than any in this concern's history. They include ten sets of 30,000-kW and over, in addition to a large number of smaller sizes. There is a 60,000-kW three-cylinder unit which has the largest output of any single-axis machine built in Great Britain; steam is reheated between the high- and intermediate-pressure cylinders and a double-flow low-pressure cylinder embodies a duplex multi-exhaust in each flow; six-stage feed heating is employed.



"Metrovick" Type FA magnetic crack detector for small parts, such as valve springs, etc.

Other large 3,000-RPM units are two of 45,000-kW of the two-cylinder type with 33-kV alternators. There are also a 32,500-kW three-cylinder turbine for steam conditions of 1,300 lb. per sq. in. at 950 deg. F. driving a 33-kV alternator and house generator. Progress is being made in the construction of a 60,000-kW 3,000-RPM two-axis plant designed for steam conditions of 1,900 lb. per sq. in. and 930 deg. F. and of a 100,000-kW turbo-alternator for 1,350 lb. and 950 deg. Salient-pole alternators are in hand up to 30,000 kVA at 100 RPM for water-power schemes abroad; these represent the largest size yet made in this country, the rotating parts alone weighing 250 tons.

The transformer shops have been just as busy as ever. Among the contracts in hand is one for six 30,000-kVA units. An order for eighteen 10,000-kVA, 22/11-kV (natural cooling) transformers includes ten for 50- and 33⅓-cycle operation which can be parelleled at 50 cycles. On-load tap-changing is incorporated in these as well as in eleven 6,000-kVA, 20/6.6-kV transformers for export.

Reactors are being manufactured as three-phase ON units for choking up to 9 per cent. on 20,000 kVA for 6-kV feeders and up to 10 per cent. on 60,000 kVA, 66-kV feeders. Other products of the department are furnace transformers up to 4,500 kVA at 11,000/200-90-V and arc-suppression coils for voltages as high as 132 kV, in addition to distribution transformers (i.e., those up to 500 kVA and 11 kV) and mining-type transformers.

Single-break switchgear for 33- and 66-kV have been put in hand for both power stations and sub-stations and 132-kV low oil content breakers have been completed for a new generating station. Among the more important of the orders received is one for sixty-one oil circuit-breakers for New Zealand, some of which have a rupturing capacity of 1,000 MVA at 110 kV.

There has been a growth in the number of orders for DC motors, many with Ward Leonard control; these include variable-speed machines for boiler-house auxiliaries. An unusual order called for two 65-HP, 100-RPM gearless motors for operating passenger lifts at 500 ft. per min. and giving a levelling speed of one-tenth of the high running speed. The Ward Leonard system is also applied to units as small as ½-HP machine tools. A large variety of DC motors is under construction for rolling mills and winders.

Induction motors under construction include one of 3,100 HP and another of 1,200 HP with a double-cage winding for high torque and low starting kVA. Orders for synchronous motors up to 1,700 HP with and without the V.A.X. system of excitation are in course of execution. Notable among the AC motors designed for special requirements is a new line of flameproof machines for oil refineries, an example of which is provided by five 200-HP, 3.3-kV units for overseas use.

For preventing ingress of moisture, AC end-windings are now being sealed, as standard, with a thin coating of bitumen. A varnish has been developed for use with woven-glass insulation, which can now be applied to any "Metrovick" motor up to 6.6 kV. Selecting further from the wide range of this company's products, one may mention progress in miniature thermal instruments for measuring h.f. currents in radio equipment and the use of the new Alnico magnet steel for a sensitive furnace temperature indicator.

Several modifications have been made in standard welders and one combining the duties of a spot and projection welder has been introduced. New developments include an air-operated temperature-controlled set for continuous spot operation with a welding pressure up to 1,000 lb. and a projection welder with an air-operated pressure head giving a maximum of 9,000 lb. Atomic hydrogen welding heads are in demand for such purposes as the automatic seam welding of pressure vessels.

A great deal of important work has been done in the traction field. This includes the completion of an order for Metadyne equipments, making 125 in all that have been supplied to the London Passenger Transport Board. Under construction are eight equipments for main line locomotives for this country, each with six 345-HP motors (one-hour rating) and capable of hauling a 350-ton passenger train on the level at 75 MPH. Developments are in hand in connection with railway signalling.

Among the more important contracts for trolley-bus equipments are repeat orders from Manchester (77) Newcastle (12) and London (25 motors and 50 motor generators). An order for thirteen complete equipments for Durban was also received. A new model of 12-HP battery vehicle with a pay-load capacity of 25-30 cwt. is in production; alternative accumulators are available to give speeds of between 15 and 20 MPH and an operating range per charge of 25 to 50 miles.

Lighting developments have included instantaneously starting mercury-discharge neon-daylight tubes with internal fluorescent coating, giving low intrinsic brightness. The earliest examples will be rated at 80 W and will be 5 ft. in length; their light output will be somewhat higher than that of a 200-W gasfilled lamp. Another new production is a 500-W, 200-260-V, AC air-cooled mercury-discharge projector lamp for burning base down, which has a maximum initial output of 25,000 lumens and an initial brightness of 20,000 candles per sq. cm.

Research subjects in hand include those on rate of size of restriking voltage in power networks, performance of switchgear contacts, forced-air cooling systems for transformers, radio interference measurement over a wider frequency range and insulating and magnetic materials. Several high-voltage impulse generators have been constructed ranging from a 200-kV unit of 60,000 μF discharge capacitance to a 1 to 2 million-V unit of the same capacitance. Numerous investigations are also being made into the stability of alloys at elevated temperatures.

Richardsons Westgarth-Brown Boveri, Ltd.

APART from a number of medium-output turbines manufactured for industrial power plants and small units with integral condensing plant for emergency use, the chief example of the work of Richardsons Westgarth-Brown Boveri, Ltd., has been the 30,000-kW three-cylinder unit with twin-shell condensing plant recently installed by a Scottish corporation. Among recent important orders is one for a 30,000-kW three-cylinder turbine with 22-kV alternator, condensing plant and auxiliaries for a power station near London.

Condensers having an aggregate surface of over 111,000 sq. ft. left the shops during 1939, one of which is said to be the largest single-shell condenser built for service in this country; the latter has a mild-steel fabricated body and cast-iron water heads and doors. Two others of single-shell design had individual surfaces of 20,000 sq. ft. A fourth Nesdrum water-tube boiler with auxiliaries has been completed for a British generating station. Its evaporative capacity is 40,000 lb. per hr. with steam conditions of 210 lb. per sq. in. and 650 deg. F. A coil-type evaporator for 1,200 lb. per hr. has also been supplied to the same station.

Yarrow & Co., Ltd.

CONTRACTS for the supply of boilers and ancillary plant for electric generating stations that have been awarded to Yarrow & Co., Ltd., during the past year include one for two complete units for a municipality in the south of England. Sixteen boilers are being added to the station of a transport undertaking which when completed will contain twenty-six boilers all of the same make. Other representative orders include repeat orders for Pretoria, Londonderry and Shabani power stations (Southern Rhodesia) and the S.A. Iron and Steel Industrial Corporation.

Factory Electrical Installations

Wartime Requirements

THE presidential address prepared by Mr. H. W. Swann (Senior Electrical Inspector of Factories) for the Association of Supervising Electrical Engineers commences with the observation that the smooth and efficient working of key industries depends to an overwhelming extent on uninterrupted supplies of electricity and on the reliability of factory electrical installations.

The same recommendations which have been made to public suppliers by the Electricity Commissioners regarding the emergency replacement of damaged equipment from the national pool of spare plant have been made available by the Home Office to large industrial concerns which generate privately. Wherever several concerns in the same district purchase power in bulk and distribute it at high-voltage to their own sub-stations there is room for mutual assistance in times of danger and in one important locality a dozen or more of the chief firms have formed a committee for pooling resources of equipment, repair facilities, and skilled labour should an emergency arise. Considerable information on these matters can be found in the A.R.P. handbooks published by the Home Office.

On the distribution side, reliability and duplication of supply, where reasonable, should be the main considerations and therefore simplification and standardisation are of first importance. Serious delays and worry are perhaps quite as likely to arise from normal wear and tear as from enemy action. Mr. Swann's advice, therefore, is to keep up stocks and order early.

For the obscuration of light, window shutters or blinds are preferable to painted glass, which may be broken by gunfire or bombs. Roof glass has in many places been replaced by corrugated-iron sheeting or other material. In a shop with efficient "north lights" it will often be sufficient to leave one-fourth of the glass for daytime lighting and to fit sliding or hinged shutters to cover this at night. Where there is danger of light emission from broken glass, there should be arrangements for reducing the light to the absolute minimum at short notice, preferably by centralised switching. Voltage reduction may also be useful for this purpose.

No light may be used at all out-of-doors except by permission of the chief constable or other officer acting for him, and in almost all cases it must be extinguished within one minute of the receipt of a raid warning. For the guidance of officials concerned in this matter, the British Standards Institution has prepared three specifications.

For works shelter lighting elaborate arrangements are not necessary, but the use of 230 V, or similar AC mains voltage is inadvisable where the conditions are such as to accentuate the risk of electric shock; fatalities have already been reported. A small transformer at 12 V, with a stand-by battery, will usually be suitable for shelters to take up to 50 persons.

The selection of 12 V allows ordinary motor car batteries and lamps to be used, which is an advantage if a fleet of lorries is maintained; 24 V may be preferable for public bodies maintaining fleets of buses, and other voltages where there are charging stations for electric trucks or battery vehicles. Higher voltages will be justified in the larger groups of shelters on the score of cost, and the danger of shock risk has to be kept in proper perspective in these days.

A very comprehensive lighting system for public shelters is described in B.S./A.R.P. No. 6, and a simpler specification suitable for small public shelters and works shelters may be issued shortly.

Many of the ultra-violet lamps demonstrated up to the present have been unnecessarily powerful and have emitted too much visible light. It is hoped that lamps of lower intensity may become available, especially of the argon filled type. If too much fluorescent paint is used, or if it is too bright, it is as visible from the air as any other source of light. Control and report centres are important in large works. The lighting of such places needs special consideration and B.S./A.R.P. No. 7 has been prepared.

ELECTRICAL MATERIALS IN 1939

Prospects for the Ensuing Year

The imposition of controls on the principal raw materials used by electrical manufacturers has created an artificial situation and the following review may be considered merely "historical." We think, however, that readers will be interested to have a concise statement of the position as it was before the war and as it is likely to be during the coming year. We are indebted to the Metal Information Bureau, Ltd., for these notes.

Copper.—At the beginning of 1939 world consumption of copper was declining somewhat, and producers within the International Control Scheme had just begun to limit their output a little again after being freed from all restriction for a period. The cut was not a very drastic one, however, since the year opened with quotas at 100 per cent., which only fell to 95 per cent. as from the beginning of March. During the second quarter of the year business generally was not outstanding, although in this country most manufacturers seemed to have quite a fair amount of work on hand, as dating from the time of the Munich discussions, increased Government orders in connection with the armament programme were bringing work to the manufacturing areas. It has been very noticeable that in the building up of Britain's armaments the electrical industry seems to have played a materially larger part than in the last world war, largely owing to the great increase in mechanisation of the Army, Navy and Air Force, all of which seem to depend upon electrical equipment of one kind or another, which in turn demands copper.

The cable and wire makers have throughout the past year been very busily employed, even when other sections of the copper consuming trades have been doing comparatively quiet business. The months preceding the outbreak of war were characterised by some large buying of copper by Germany, and a good deal of metal was also taken by other European countries, notably Russia. Japan has been a big buyer throughout the year, but mainly in the United States. In America consumption was disappointing until the third quarter of the year when a modest improvement began to make its appearance, to be followed by a wild scramble for supplies and a big jump in actual consumption.

Immediately war broke out the British Government announced stringent control of non-ferrous metals and issued maximum prices for copper of £46 for standard and £51 for electro. All supplies had to be obtained through the Ministry of Supply's Non-Ferrous Metal Control which had made arrangements with Empire producers to supply very large tonnages of the metal to this country at approximately pre-war prices. As a result the British price has ruled for a considerable period at well below the world price, and even although it has now been raised fairly sharply to £62 delivered consumers' works for electro, it is still well below the American export quotation. France had to buy copper in the open market, purchasing in New York 150,000 tons for delivery over six months, the metal involved being African and South American.

Wartime conditions make it virtually impossible to forecast the trend of events in 1940, but it can safely be said that consumption in this country will remain at a very high level, and that there is every prospect of adequate supplies being forthcoming from Empire producing countries at reasonable prices. The reluctance of America to sell to Russia since the Finnish trouble has tended to deprive the market of one of its main props, especially as the U.S.-Japan trade treaty is scheduled to come to an end fairly soon. However, with practically the whole world at war or in a state of semi-mobilisation, copper consumption in 1940 is almost certain to be large, and prices generally should be well maintained.

Tin.—In the first half of the year tin was a somewhat depressed market so far as trade was concerned, but the International Control Scheme maintained prices. A big increase in demand developed during the third quarter, and this was intensified by the outbreak of war. As a result production quotas were raised from 40 per cent. in the second quarter to no less than 120 per cent. (retrospectively) in the third quarter. Even so consumers' demands exceeded supplies in the early period of the war when the price in England and in the Straits Settlements was fixed at a maximum of £230 by the Government. The removal of this maximum price in December led to a sharp jump in quotations but to greater freedom of supplies.

Consumption at present is very large, and in addition the United States Government is accumulating a considerable reserve under the Strategic Materials Act. Producers, therefore, seem assured of active conditions and very satisfactory, if not extravagant, prices during the coming year.

Lead.—There were not many developments of interest in the first half of 1939 so far as lead was concerned, the market jogging along steadily at a price level just about adequate but not very attractive to producers. The building industry began to decline somewhat, but increased demand from cable makers in connection with the growing Government electrical orders tended to offset this falling away. In the third quarter of the year there was a noticeable broadening in demand from European countries, including Germany, and firmer conditions began to develop.

On the outbreak of war lead came under Government control in the United Kingdom and, as in the case of copper and spelter, supplies were contracted from Empire sources at approximately pre-war prices. World quotations after the outbreak of war jumped much above the United Kingdom level and remained so until December when the latter was raised.

The demand for lead for house building virtually stopped once the war broke out, but increased requirements by cable makers and by the battery trade fully offset this, and at the present time available supplies from the large Empire producers are being readily absorbed on work on national importance. There should be no shortage of material from within the Empire, which produces a large proportion of the world's lead output, but it is not always easy to obtain the necessary shipping space for the required supplies to be transported.

Since the outbreak of the war American demand has increased amazingly but now shows signs of reacting a little. Mexico is having some difficulty in disposing of all her large output as the United Kingdom and Germany were formerly large customers. Prospects for the coming year are hard to define, but it looks as if the United Kingdom and European consumption will be large, although Germany will probably have to manage with less lead than usual. With the controlled price here now £25 a ton delivered, the United Kingdom and world markets are in fairly close alignment, and at the moment there appears little reason for any further major rise.

Spelter.—The main item of interest in the early part of the year in the spelter position was the upward revision of the United Kingdom import duty, coupled with a direct subsidy to the home producer from the premium on imported Empire metal. As the war clouds gathered, world demand increased, and since the outbreak of hostilities British consumption has been remarkably large, but has been entirely satisfied from Empire sources at very reasonable prices under the Government control arrangements. In December the maximum price here was advanced somewhat sharply, but only to around the world level. Germany is very well placed for supplies now she has captured the Polish zinc producing area. The American market suffered somewhat from the lower import duty in force this year, but since the war domestic demand has been large, prices higher, and stocks have fallen rapidly. Taking the world as a whole there is no particular tightness in zinc supplies as a substantial volume of concentrates formerly treated on the Continent are now held back by the British contraband control.

The brass industry is working at very high pressure here, and seems destined to remain so. Galvanisers in this country have been busier than for years, whilst an outstanding feature, of course, has been the increased demand for thin zinc sheet and strip in the manufacture of battery cans, the demand for which, as everyone knows, has "multiplied exceedingly."

Aluminium.—For aluminium in particular, 1939 has been an exceptional year. Rearmament has led to remarkable demands for the aircraft industry, and transport, electrical and structural industries have also been busy. All producing units have stepped up their output and extended their plants, and production in most countries is at an unprecedented level. The Minister of Supply is now the sole seller of virgin metal at £110 a ton, delivered, and the whole light metal industry is directed to supplying war needs, industrial products having had to be completely sidetracked in most instances. Works are booked up 12 months ahead in some cases.

Rubber.—In the first half of the year consumption was not so good as might have been hoped for, permissible exports being fixed at only 50 per cent. of basic quotas by the International Rubber Regulation Committee. As with most other

PERSONAL AND SOCIAL

Information regarding new appointments and other matters of interest for this page are welcomed

AN interesting ceremony took place on December 28th when Mr. J. Snow Huddleston, managing director of the Union Cable Co., Ltd., made a presentation of a Marconi radio set to **Mr. T. Johnstone,** works superintendent of the company's factory at Dagenham Dock, upon his retirement after over thirty years' service. In the presence of a large number of the staff Mr. Huddleston mentioned that Mr. Johnstone during his long service had endeared himself to members of the staff and also the works people, and hoped that in years to come he would enjoy good health in his retirement. Mr. Johnstone, in reply took the opportunity of thanking the many friends he had made during his long service with the company, not only for the valuable gift, but also for the help they had given him.

Mr. John Waddell, chairman and managing director of the D.P. Battery Co., Ltd., has recently completed fifty years' service with the company. Born at Greenock, he entered the employ of Johnson & Phillips, Ltd., in December, 1889, where D.P. batteries were first manufactured under licence from the French firm of Dujardin Planté, from whom the initials D.P. originated. In 1898 the present property at Bakewell was purchased, and on October 17th, 1901, Mr. Waddell was appointed manager. In 1932 he became chairman and managing director. The development of the battery industry has been extensive since Mr. Waddell became associated with it. In the early days the chief demand for D.P. batteries was for country house lighting. The erection of power stations (mostly DC supply) saw a rapidly increasing demand for these batteries, and a milestone in the history of the company was the introduction of the Kathanode patent separator in 1917, for which Mr. Waddell was responsible.

Mr. J. Waddell

Mr. Waddell is a keen sportsman, having been a member of the Arsenal team in 1897 and being associated with the formation of Charlton United F.C. (now Charlton Athletic). His present recreation is golf. To mark the completion of his fifty years with the D.P. company, the senior members of the head office staff have presented him with a cigarette case suitably inscribed, together with a letter of congratulation.

Bolton Corporation Electricity Committee has appointed **Mr. T. Jack,** resident engineer at the Back-o'-th'-Bank station, to the newly created post of deputy borough electrical engineer, and manager, at a commencing salary of £750 a year. The post of resident engineer is to be discontinued.

Mr. F. H. Fielder, late North-West England branch manager for Laurence, Scott and Electromotors, Ltd., at Manchester, has joined the general engineering department of the Metropolitan-Vickers Electrical Co., Ltd., at Trafford Park, Manchester. Previously Mr. Fielder was contracts manager for the Harland Engineering Co., Ltd., at Alloa.

Among the members of the Advisory Council on Scientific Research and Technical Development appointed by the Minister of Supply are the following:—Dr. E. N. daC. Andrade, Professor of Physics, University of London; Dr. E. V. Appleton, Secretary, D.I.S.R.; Dr. W. L. Bragg, Professor of Physics, Cambridge; Dr. J. D. Cockcroft, Professor of Natural Philosophy, Cambridge; Dr. H. L. Guy, Metropolitan-Vickers Electrical Co., Ltd.; Sir Frank Smith; and Sir Henry Tizard, Rector, Imperial College of Science.

Mr. J. C. Poole, mains engineer at Surbiton with the London and Home Counties J.E.A., has been granted an honorarium of £150 for his work in connection with the establishment of the Authority's new 33-kV system during the last two years.

Mr. E. S. Bloom, president of the Western Electric Co., Inc., of New York, has been appointed a director of purchases for the British Purchasing Commission in New York. The appointment follows Mr. Bloom's retirement from Western Electric after forty-three years' service with the Bell Telephone System. Associated with Mr. Bloom in his work for the British Purchasing Commission, is Mr. F. Johnson, vice-president of the Bell Telephone Co., of Canada, since 1935. Mr. Johnson is appointed director of administration.

Mr. C. C. Rattey, M.I.E.E., has resigned from the board of Philco Radio and Television Corporation of Great Britain, Ltd. He undertook to assist the company's recovery by instituting a policy of diversification of manufacture. These efforts having assured the company of sufficient work to fill the available factory space, he has asked the board to allow him to retire. **Mr. L. D. Bennett,** M.Sc., has been elected chairman in Mr. Rattey's place.

Mr. P. Clegg, B.Sc. (Tech.), A.M.I.E.E., whose appointment as borough electrical engineer at Macclesfield was reported in our last issue, has been connected with the electrical industry since 1912, when he began his apprenticeship with Mather & Platt, Ltd., at Park Works, Manchester. After a short period of training with Ferranti, Ltd., at Hollinwood, he entered the service of the Rochdale Corporation Electricity Department, but left soon afterwards to join the Royal Naval Air Service. Upon returning to civil life, he took the degree course in electrical engineering at the Victoria University of Manchester, and graduated in 1921 as B.Sc. (Tech.). Later in the same year he returned to Rochdale as mains assistant.

Mr. P. Clegg

Mr. Clegg obtained his first appointment as chief electrical engineer when he joined the Bingley electricity undertaking. A brief period as borough electrical engineer of Haslingden was followed by his appointment at Morecambe and Heysham where he has been for the past seven years. In this position he has been responsible for the illumination schemes which have been carried out each autumn at a cost of £12,000, and have attracted more than two million visitors. Mr. Clegg was elected to the I.M.E.A. Council in 1938. He takes up his duties at Macclesfield on February 1st.

Mr. P. Wardle, chief engineer and general manager of the Cannock U.D.C. Electricity Department, who has withdrawn his acceptance of the position of borough electrical engineer at Macclesfield, informs us that the Cannock Council has confirmed the recommendation of the General Purposes Committee that his services at Cannock shall be retained, and that as from January 1st his salary shall be in accordance with the Walker scale for chief electrical engineers.

As from January 1st, **Mr. R. N. Pegg** is leaving the Kensington & Brompton district of Central London Electricity, Ltd., to take over the position of chief engineer of the Westminster and Chelsea district of the same company from **Mr. S. B. Evitt,** who is retiring. **Mr. D. E. Gough,** who was Mr. Pegg's deputy at Kensington & Brompton, has been appointed in his place as chief engineer of the district.

Mr. R. Todd, electrician, who for over sixty-three years has been with Kelvin, Bottomley & Baird, was recently presented with a wallet of notes at the firm's new Hillington Works. The presentation was made by Mr. F. C. Stewart, chairman of the company, who congratulated Mr. Todd on his long service. Mr. Todd, who fitted the first electric lighting equipment in a Glasgow house—Lord Kelvin's house at

(Concluded at foot of next page.)

Electrical Materials in 1939 (*Concluded from p. 14*)

strategic raw materials, however, the third quarter saw a broadening in demand, and quotas were raised to 60 per cent., the figure for the final quarter of the year being advanced to 75 per cent. Demand for rubber by the electrical industries in Europe expanded appreciably as the year wore on, and, of course, leaped upwards when war broke out. The American motor car trade, however, was somewhat depressed until September, so that the tyre industry which is the major consumer failed to give the market the support that had been hoped for.

During the year the United Kingdom concluded barter deals with America and with Russia involving the shipment of considerable quantities of rubber, and these contributed to the improvement in the market. The war is likely to result in the virtual elimination of German, Polish, Austrian and Czechoslovakian consumption, amounting in all to 120,000 tons a year. Nevertheless, increased demand in other directions seems likely to keep the rubber estates tapping pretty hard during the coming twelve months, and prices should remain at the much more remunerative level now in force. Indeed, prices are almost up to the highest figure seen since the slump of nearly a decade ago.

CORRESPONDENCE

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

"Nobody's Babies"

MR. BRAMMER'S letter in your issue of December 29th clearly shows that he does not realise the nature and elasticity of the N.J.B. Schedule. The industry as a whole fully understands the position, and there I am content to let the matter rest. The last paragraph of his letter is so illogical and inaccurate that I leave those who have properly read the Schedule to decide whether an accountant could by any stretch of imagination be graded under it. The industry as a whole is not prepared to standardise the duties and responsibilities of installation inspectors (which differ very materially) merely to accommodate the views of Mr. Brammer's Association.

I think I can say with confidence that neither the National Board nor the National Council will contemplate the setting up of a new organisation to deal solely with one grade of employee. The alternative course of each individual undertaker accepting an alleged agreed rate for installation inspectors when there is in fact no body of employers with whom to negotiate the rate, is equally out of the question.

I have stated the position as I see it in correspondence with Mr. Brammer, and invited him (if he thinks I am wrong) formally to approach either the National Board or the National Council on the matter. I must, therefore, advise all undertakers that in the present circumstances they would be most unwise to enter into any negotiations in relation to installation inspectors except via the existing machinery of the National Board or the National Council. A. H. BANKS.

Manchester, *December 29th.* *Employers' Industrial Adviser.*

Classification of Copper

We have read with interest the article headed "Classification of Copper" on page 820 of your issue dated December 29th, and agree with you that the classification of commercial copper in the Control of Non-Ferrous Metals (No. 5) Order, 1939, is perhaps not as clear as it might be. For instance, under Section 2 of the classification, which reads "Fire refined copper sold or intended to be sold as high conductivity copper," we would prefer to see "High conductivity fire refined copper."

As refiners of the E.R.M. brand of copper, we do not agree with the information you have given in paragraph 4 of your article. Doubtless you have been misled by the classification of coppers under the Non-Ferrous Metals Control Order, but we would like to point out that our E.R.M. copper does not fall under item 3 of the classification. You mention that, in nearly all cases under No. 3, the minimum copper content of this grade would be approximately the same as that of high conductivity copper grades—*i.e.*, 99.88 per cent.—although the metal might not always be suitable for electrical purposes requiring the highest conductivity.

We would like to point out that the E.R.M. brand contains a minimum amount of copper of 99.95 per cent., and is always suitable for electrical purposes requiring the highest conductivity. The E.R.M. brand of copper, therefore, comes under Section 2 of the classification, and not under Section 3. As many of your readers purchase this brand of copper for electrical purposes, we would be much obliged if you would correct this mistake. ENFIELD ROLLING MILLS, LTD.,

Enfield, *January 1st.* C. E. F. PLUTTE, *Managing Director.*

[The comments to which Mr. Plutte refers were not ours but those of the Copper Development Association but we have pleasure in inserting this letter to clear up any misapprehensions.—EDS. ELEC. REV.]

Trolley-bus Supply

Mr. C. Turnbull's letter of December 9th puts forward a very interesting alternative suggestion for the employment of three-wire supply to trolley-buses. His idea is practicable, as I understand that an electric traction system in Vienna is supplied on the same principle. Both methods would necessitate an amendment of the normal maximum of 650 V specified by the Minister of Transport to "650 V to earth" for use in this country.

I do suggest that each method has its own particular field of application, and is an improvement on present two-wire supplies. If in practice a good balance is possible on up and down lines for a very heavy service with sub-stations relatively close together, as shown in the original article, then the proposal to make the up and down routes of opposite polarity would prove to be the most economical, as balance should be obtained between individual buses *via* the tie lines at each support.

The line in Mr. Turnbull's scheme, however, as he points out, would work as a two-wire system, and the balance therefore would be between sections, and the economies accrued would be on feeder loadings only; these are less than 50 per cent. of the total savings calculated as being possible in the original example, from which the calculations were omitted owing to considerations of space.

It is agreed that cross-over problems would be more difficult and if these are found incapable of solution or considered too dangerous for the linesmen, then such junctions could be sectionalised and supplied from one pole only, with the other pole continued through by means of a by-pass. T. KEARNS.

Blackpool, *December 20th.*

The Reward of Ability

Glancing through the "Situations Vacant" columns of the December 22nd issue of the REVIEW I noted with downcast feelings a displayed advertisement calling for the services of a working foreman electrician, age to be not less than 30 years, with a sound knowledge of his business. The wages offered were 1s. 6½d. per hour.

It grieves me very much to know that some people put the same value on electrical engineers as on skilled labourers or policemen. I hope the Barnstaple people get just exactly what they are asking for. A. MILNE.

Glasgow, *December 23rd.* (Alexander Milne & Co.).

Personal and Social (*Concluded from preceding page*)

the University—is still busily engaged on work of National importance. Acknowledging the presentation, he recalled that he started work with James White, founder of the firm in 1876. He was also associated with Lord Kelvin when he was advancing the science of navigation by epoch-making inventions. He recalled the days when history was made at the firm's old Renfrew Street factory in the manufacture of the early electrical instruments.

Sir Harry Brown, who recently accepted the position of chairman and managing director of the British General Electric Co., Pty., Ltd., took up his duties on January 1st. Sir Harry Brown has had a distinguished career. He was on the staff of the British General Post Office for twenty-five years and went to Australia in 1923 as technical adviser to the Commonwealth Government in connection with Post Office matters. He later became Director-General of Posts and Telegraphs for the Commonwealth from which post he has just retired. **Mr. Edward Hirst** is associated with Sir Harry as joint managing director and vice-chairman of the company.

A complimentary dinner was given recently at the Dorchester Hotel in honour of **Mr. E. R. Clarke,** the senior director of G. A. Harvey & Co. (London), Ltd. During the evening Mr. Clarke was presented with a canteen of silver to commemorate his recently completed fifty years of service with the company which he joined as a boy in 1889; he became a director in 1914. Mr. S. Harvey, the chairman of the company, who presided, made the presentation.

Mr. J. B. Harris, Grad. I.E.E., who is on the staff of the Illuminating Engineering Department of Harcourts, Ltd., was married recently to Miss F. L. Margrett, of Edgware, Middx.

Obituary

Rear-Admiral C. P. R. Coode, C.B.—*The Times* reports the death of Rear-Admiral Charles Penrose Coode, C.B., D.S.O., general European representative and general manager of the Western Union Telegraph Co., which occurred on December 23rd at the age of sixty-nine. He had been in the Navy for over thirty-eight years when in 1922 he retired to take up work with the Western Union Telegraph Co.

Mr. Lewis Barber, of Tenterden, Kent, whose death is announced at the age of fifty-four years, was for twenty-four years chief electrical engineer of the Great Indian Peninsula Railway. He went to India in 1913, and retired to live at Tenterden in 1936.

Will.—Sir A. N. L. Wood, chairman of A. Reyrolle & Co., Ltd., and a director of other companies, left £143,123, "so far as at present can be ascertained," with net personalty £73,935.

NEW ELECTRICAL PRODUCTS

Review of Equipment Recently Marketed

Street Lighting Equipment

IN designing the G.E.C. street lighting unit referred to last week (page 819) one of the main considerations has been ease in fixing to existing lanterns, because it is felt that the cost and labour involved in removing lanterns or rewiring them must be taken into account. It was also thought desirable, on account of possible vibration, that the unit should not be supported on the lampholder. Accordingly, the units consist of two main parts—the light controlling device proper and its support. These are arranged to fit rigidly into the existing lanterns. For this purpose the supports for the glassware of the lanterns are employed and suitable fixing arrangements can be provided for any given type of lantern. The wiring from the new lampholder is carried out by means of the short length of flexible cord supplied and a lampholder adaptor fixed into the existing lampholder. No rewiring is necessary.

The " Z.3210 " fitting

Two different optical designs are available—one employing 25- or 15-W lamps and the other 60- or 40-W lamps. The 15- or 25-W lamps provide sufficient light but the more robust higher wattage lamps are favoured for withstanding the vibration which exists at the top of tall columns. The " Z.3210 " unit for 25- or 15-W lamps is constructed of spun steel and incorporates a patent lighting unit consisting of a flashed opal cylinder with sheet metal grid to provide the correct light distribution and intensity. The base is detachable for ease of maintenance. Units of this type can be supplied for the three mounting heights permitted and can be arranged for fitting either to existing lantern bodies or to lampholders. With the " Z.3200 " units, which are constructed of lead-coated sheet steel, a 60-W lamp is required for the nominal mounting height of 15-20 ft., and 40-W lamps for a height of 10 ft.

SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38-39, Upper Thames Street, London, E.C.4, also announce that they are engaged on research designed to utilise the low standard of lighting now permitted to its best advantage and will shortly be putting a range of fittings on the market.

Infra-Red Ray Lamp

A table model of its " Sollux 400 " domestic infra-red ray lamp has been introduced by HANOVIA, LTD., Slough. It gives easy adjustment to any angle and is readily portable. The finish is anodised aluminium and glossy maroon " Dulux."

Black-out Signs

A sign made by J. E. WILDBORE, Victoria Works, 26, Marlborough Street, Oldham, is suitable for peacetime as well as wartime. The face and sign-written panels are built up from two sheets of glass, one transparent and showing the name, &c., and the rear sheet of opal glass. This method of preparing the face gives thorough visibility, yet when the fitting is required as a black-out sign it possesses the properties of diffusion. The use of a special sliding cowl, which is readily detachable by undoing two thumbscrews, renders no light whatever visible from the sky.

Normally a lamp connected with the mains is used, but should the supply be discontinued a dry battery system can be quickly brought into operation, a reflector enabling a comparatively good light to be given with a very small consumption of electricity from the battery. The two-piece, lead-coated, sheet-metal construction keeps out rain, snow, &c.

A range of 6-V " Open " shop signs made by V. & E. FRIEDLAND, LTD., 156-8, Fairfax Road, Harringay, London, N.8, should prove popular for black-out window lighting. A 3-A lamp is fitted. Appropriate models for doctors, dentists, newsagents, tailors, grocers, cafés, &c., are available, and a suction device enables them to be fitted on the window where required. They are supplied complete with transformer plug and 2½ yards of flex.

The neatly finished signs made by the SUN ELECTRICAL CO., LTD., 118-120, Charing Cross Road, have 4-in. white illuminated letters on a black background with the outer case finished in gold. They are intended for use with 5-, 15- or 25-W pearl lamps, and any desired wording can be supplied.

Shop Window Lighting

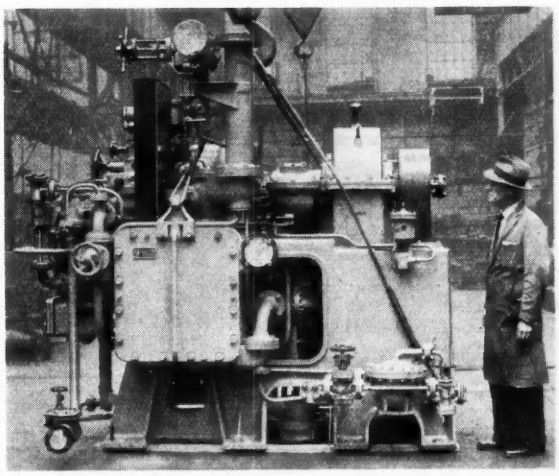
For the lighting of shop windows in accordance with the new Home Office regulations, BROWN BROS., LTD., Gt. Eastern Street, London, E.C.2, are now marketing the A.R.P. " Windolite " unit, measuring 6 in. by 6 in. by 9 in. and fitted with an adjustable fixing bracket and bakelite lampholder.

A feature of a similar fitting, the " Windowlite," supplied by the SUN ELECTRICAL CO., LTD., 118-120, Charing Cross Road, London, W.C.2, is a stirrup bracket with wing nuts for adjustment of angle.

A Portable Turbine

For providing power in emergency, RICHARDSONS, WESTGARTH & CO., LTD., Hartlepool, have produced a 350-HP two-stage impulse condensing turbine which can be designed for normal steam pressures and temperatures. The weight of the turbine and condensing plant is less than 7 tons. The shaft and impulse wheels are machined from a single nickel-steel forging and are carried on roller bearings. Cast-steel is used at the live-steam entry and cast-iron for other parts of the casing. Governing is by oil-pressure control of double-beat valves. Single-helical reduction gear gives a final speed of 1,500 RPM.

The condenser, which with the oil tank is incorporated in the bed-plate, contains just over 270 sq. ft. of cooling surface. Circulating-water and condensate pumps are mounted vertically on one shaft (within the base of the bed-plate) and gear driven from the slow-speed shaft of the reduction gear. A separate two-stage steam-operated air-ejector is mounted on the condenser. An oil system and complete steam accessories are provided. Portable generators and boilers have also been developed for use with the turbine.



Richardsons, Westgarth portable turbine

Multi-purpose Table Lamp

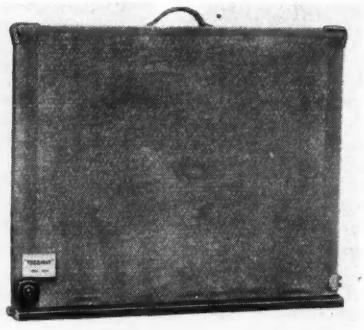
A collapsible table lamp which can easily be taken to pieces and packed in a satchel is now being made by BEST & LLOYD, LTD., Handsworth, Birmingham. It is, of course, especially useful for travelling, but the novel crush shade makes it valuable at the moment for use in rooms where it is desirable to screen the light from windows which have been ineffectively blacked out. It is, too, suitable for sick rooms where illness makes dim lighting desirable, and in other cases where local light control is required.

Best & Lloyd travel lamp

The shade is supplied in either blue or green silk lined with black, the top discs being of asbestos and card. The turned wood pillar and base are enamelled to match the shade. A push-bar holder is fitted, together with 20 ft. of flex and an adaptor plug. The satchel, which measures about 9 in. square, is of rexine in colours to suit the shade or in cream. If desired, the shade can be purchased separately for use on an existing table standard.

Heating Panel

A convenient and safe method of warming nurseries, sick rooms and—of special interest at present—air-raid shelters, is provided by the "Thermat" heating panel supplied by THERMAT, LTD., Peveril Street Works, Nottingham. With a loading of only 400 W the panel can be used from any lighting socket and maintains a temperature of 150-160 deg. F., which will scorch neither people nor clothes. Thermostats guard against overheating and as there is no incandescence the oxygen in the air is not burnt up—a feature of particular importance in air raid shelters that have been made gasproof.



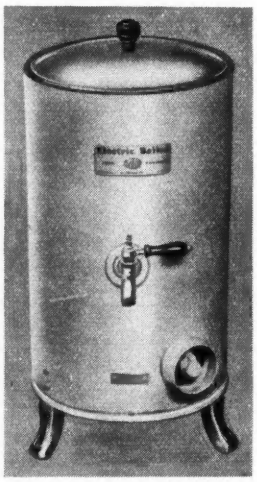
"Thermat" heating panel

By backing with a layer of heat insulating material and a heat reflector, the panel can be adapted to throw heat to one side only and can therefore be mounted on a wall or on a screen, &c. A switch is provided to cut out half the elements.

Water Boiler

An electric boiler particularly suitable for restaurants, canteens, schools, &c., is a new product of SAMUEL SIMISTER & Co., Croston Street Copper and Tin Works, Bolton, Lancs. It is available in 4- and 8-gal. sizes with loadings of 2½ and 3½ kW, respectively. If required two kick switches, or alternatively a double-pole rotary switch, can be fitted to give three-heat control, while a safety cut-out is another optional refinement.

The outer case is of galvanised steel. The standard finish of this is cellulose enamel in any desired colour, but a porcelain enamel finish is also available. The inside pan and the domed lid are both of copper, tinned inside. The tap is chromium plated with a heat-resisting handle.



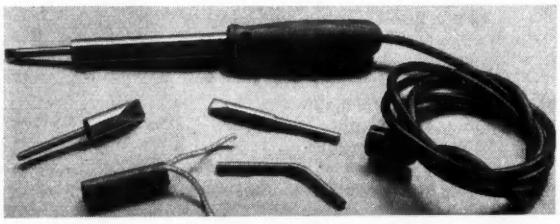
Simister electric water boiler

Time Switch

A time switch incorporating an eight-day period, hand-wound reserve spring has just been produced by NATHAN & ALLEN, LTD., 131, Victoria Street, S.W.1, constructed on the same lines as their eighteen-day "S" model, but about 20 per cent. cheaper. It has been developed for shop window lighting control or other similar situations and is available in capacities of 10, 15 and 25 A, 1-, 2- and 3-pole AC up to 380 V and DC up to 240 V.

Soldering Iron

Long life is claimed for a new type of heating element incorporated in a range of soldering irons made by ELCO (TREFOREST), LTD., Treforest Trading Estate, near Cardiff. This



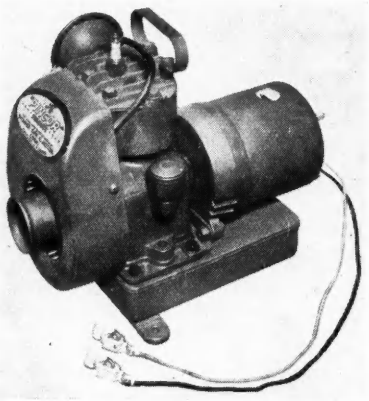
Elco soldering iron

element comprises high quality nickel chromium resistance wire embedded in ceramic, the whole being wrapped in mica and inserted in a brass tube. All risk of shock from contact is thus avoided, and the method of construction besides increasing the life of the element also enables the loading to be considerably reduced.

At present three models with loadings of 50, 75 and 100 W, are available, but shortly units with loadings up to 200 W will be placed on the market for industrial use. With the set of four easily interchangeable bits supplied, it is possible to do practically any type of work required. A striking feature of the iron is its exceptionally light weight and neat design.

Emergency Lighting

Wartime conditions have aroused a considerable demand for small petrol engine-driven generating sets. It is therefore of interest to learn that no fewer than fifty-four models of the "Pioneer" units are now offered by the BRITISH MOTOR BOAT MANUFACTURING Co., LTD., Britannia House, Ampton Street, London, W.C.1. Standard capacities range from 100 to 5,000 W, the chief variations being in regard to voltage. Some of the outfits are arranged to supply both AC and DC, 110 V AC, and 6 V DC being a popular combination. Alternatively 230 V AC can be given with 6, 12 or 32 V DC. This is a useful feature when battery charging is required.



Small portable "Pioneer" generating set

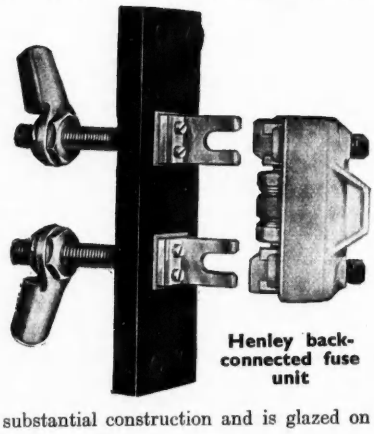
All engines are of the four-cycle type, air or water cooling being optional in the larger models. If the generating plant is used in conjunction with a battery, press-button starting can be used, the generator acting as a motor until the engine commences to run.

Lightness and compactness are special features and many of the smaller models are easily portable. One unit, for example, a 6- or 12-V, 200-W model, weighs only 49 lb. and measures only 10 in. by 11 in. by 15½ in. overall. It is provided with a handle for carrying.

Panel Mounting Fuse Units

Distribution engineers who have to deal with the building up of low-voltage switchboards for large blocks of flats, factories, &c., will be interested in a new range of standard fuse and link units for panel mounting introduced by W. T. HENLEY'S TELEGRAPH WORKS Co., LTD., Milton Court, Westcott, Dorking. These replace the ranges, standardised for many years, with porcelain carriers fitted with asbestos tubes for open strip elements.

The front connected fuse unit is fitted with a high-rupturing-capacity cartridge fuse in a porcelain carrier with hand operated contacts, and can be obtained mounted on a porcelain base or unmounted. The porcelain base is of substantial construction and is glazed on front face and edges.



Henley back-connected fuse unit

The back-connected type is mounted on a high-quality slate base, which is enamelled on the front face and edges and is complete with insulating bushes. This unit can also be supplied without the base. These panel units are also available with wedge type links in porcelain carriers or the wedge type link can be supplied without the carrier.

The design of the new porcelain carriers provides a much improved grip and insulating knobs of a new shape to assist in tightening the wedge device. The carriers form an efficient shroud to the sides of the cartridge fuse or link and a square recess provided on the front of the carrier enables the amperage of the cartridge fuse to be recorded.

NEW BOOKS

Ultra-violet Ray Analysis. AC Manual. Factory Organisation.

Fluorescent Analysis in Ultra-Violet Light. By J. A. RADLEY & JULIUS GRANT. Third Edition. (Pp. 424; figs. 50.) Chapman & Hall, 11, Henrietta Street, London, W.C.2. Price: 22s. 6d.

The use of fluorescence as an aid to analytical technique has been stimulated by the introduction of more efficient sources of ultra-violet radiation. Methods which formerly were employed only by the specialist are now being applied to the control of industrial processes, to the routine examination of materials to detect flaws or contamination, to determine the nature and extent of adulteration, and even to the detection of crime.

The way in which these and many other applications of fluorescence analysis are advancing is indicated by the appearance of this third edition of Radley and Grant's well-known book. A large number of original papers, published since the second edition in 1937, have been summarised in the present volume and consequently, the bibliographies at the end of each chapter have been enlarged and have been supplemented by additional references to other relevant papers not otherwise mentioned in the text.

In Part I of the present volume, which deals with the theory and technique of fluorescence analysis, some new and important additions to the range of ultra-violet lamps are described. The chapter on methods and technique has been further expanded and continues to be a source of stimulation to workers in this field. It provides ideas for applications of this powerful weapon of fluorescence to analysis and control. The second and larger part of the book is divided into twenty sections each dealing with particular applications of the fluorescence technique.

Those already familiar with the earlier edition of the book will wish to consult the new edition and workers in a wide variety of fields will find it helpful to familiarise themselves with the contents of this valuable source of information.—J. N. A.

Alternating Currents. By Carl Edward Magnusson. (Pp. 721; figs. 609.) McGraw-Hill Publishing Co., Ltd., Aldwych House, London, W.C.2. Price 30s.

This very well-known book, now in its twenty-fourth year, needs but little further recommendation in its present guise. An American production, it is naturally better known in the States than in Great Britain, but it is safe to say that wherever A.C. principles are taught and studied Magnusson's "Alternating Currents" is a welcome guide, philosopher and friend.

The general make-up of the book has not changed to any appreciable extent since its first appearance and succeeding issues have, in general, simply brought the subject up to date in both the theoretical and practical fields of endeavour. This procedure has been responsible for the addition of some 200 pages to the first edition.

The contents embrace fundamental electric-magnetic and dielectric theory; studies of series, parallel and complex circuits; voltage, current and power in single-phase and polyphase circuits; transformers; induction motors and generators; generators; synchronous machines; commutator motors; rectifiers; transmission lines; voltage regulation; protective appliances; and certain theoretical studies of polyphase systems and notations. The book is illustrated remarkably well, not only numerically but also in a most painstaking manner, calculated to provide a maximum of reinforcement to a clear understanding of the text.—S. A. S.

Properties and Strength of Materials. By J. A. CORMACK AND E. R. ANDREW. (Pp. 383; figs. 102.) Macmillan & Co., Ltd., St. Martin's Street, London, W.C.2. Price 8s. 6d.

While it is absolutely essential that the electrical engineer should have a good working knowledge of the strength and elasticity of the materials used in the construction of his generators, motors, switchgear and so on, there are many other properties which have an important influence upon the suitability or otherwise of the materials for any particular job. The subject which goes by the name of "Strength and Elasticity of Materials" and which is to be found in the syllabus of the examinations of all the engineering colleges and institutions, generally speaking, ignores these important subsidiary properties and consequently the majority of text-books which cater for engineers studying for these examinations do likewise.

Here, however, we have a book which, as its title implies, discusses the various properties of materials primarily from the point of view of their use in engineering design and, while among these strength and elasticity necessarily play an important part, other properties such as hardness, resistance to fatigue and resistance to corrosion receive the consideration they deserve. The result is a volume which will not only help the engineer to pass examinations, but will give him a real understanding of the nature of the various materials which he uses in his every-day work and of their specific capabilities for any particular job. Brief notes are given of the manufacture of the different materials including, not only the ferrous and non-ferrous metals and their alloys, but also of the non-metallic materials such as timber, concrete and the various plastics which because of their insulating properties are so extensively used in electrical engineering. A chapter on the different types of testing machine is also included.

As indicating the scope of the book, it may be mentioned that in an appendix is given a selection of questions set by various examining bodies, including the Institution of Electrical Engineers. It would, however, add greatly to the value of this section if the numerical answers were also given, as the student gains considerable confidence when he is in a position to check the accuracy of his calculations. With this exception, we have nothing but praise for this excellent book. It is well produced, the diagrams are clearly drawn and the half-tone illustrations are very good. It is economically priced and can be recommended to the electrical engineer.—A. R.

Factory Layout, Planning and Progress. By W. J. HISCOX. Second edition, revised by J. Stirling. (Pp. 195; illus.) Sir Isaac Pitman & Sons, Ltd., Parker Street, London, W.C.2. Price 7s. 6d.

Broadly speaking, production control in the modern factory may be considered as comprising two major elements, one involving the making of advance preparations before an actual start is made on production against an order, the other entailing day-to-day arrangements to see that the plans work out right in practice. The author of this book treats his subject in this way and divides the book into two parts, one dealing with planning and routeing, the other progress work.

In the first section we are shown the factors to be considered in planning factory layout and in the allotment of executive duties. Then the planning function is dealt with from the angle of design and through all the steps necessary to transform raw materials into finished parts and completed assemblies. In the second section the author shows how the progress function carries out the ideas of the planning department by arranging for supplies, guarding against congestion and gaps and checking off the progress of production at each operation to see that delivery commitments are maintained.

The book is well illustrated and is written in a non-technical manner by a man who has his feet on the factory floor all the time. The author shows a tendency to stress the obvious and those already familiar with his subject may find the style a little tedious. So far as the student is concerned, however, this may prove an advantage, and the book can certainly be warmly recommended as an elementary textbook on factory planning and progress. There are, however, a few points on which the student will have to read much further before he can claim a mastery of his subject. For instance, the author mentions the splitting up of the quantity of a production order when "the operation is of a lengthy character," but gives no real indication of the reasons for this step or the principles involved in the determination of economic-sized orders.—A. W. W.

Mr. Tompkins in Wonderland or Stories of c, G & h. By G. GAMOW. (Pp. 91, illus.). Cambridge University Press, Bentley House, 200, Euston Road, N.W.1. Price 7s. 6d.

This ingenious work, by the Professor of Theoretical Physics at the George Washington University, Washington, D.C., is an endeavour to convey to the layman some conception of the "new physics" propounded by Einstein, Planck, Böhr and other modern scientists. Without the mathematical genius of these, complete understanding is impossible, but the method employed (the recounting of a bank clerk's dreams after hearing a series of lectures, given as an appendix) awakens some understanding in the ordinary reader's mind. This dream world is one in which phenomena ordinarily inaccessible to everyday observation are applied to the events of everyday life. We have struggled with many attempts to simplify the conceptions of curved space, quanta and other mysteries, but the book comes nearest to achieving the object, and a goodly proportion of the credit is due to the illustrator, John Hookham.—J. H. C.

COMMERCIAL and INDUSTRIAL NEWS

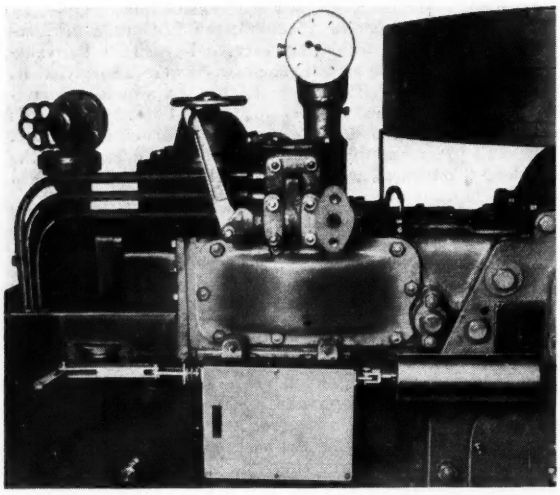
Scottish Electricians' Wages. Iron and Steel Order. Street Lighting Specification. Effective Window Display. Long Service Awards

Anglo-Swedish Trade Agreement

A WAR trade agreement has now been signed between the United Kingdom and Sweden. The object is to adapt the existing Anglo-Swedish trade arrangements to wartime conditions with a view to maintaining trade between the two countries, so far as such conditions permit, at a normal level. To assist in the smooth operation of the arrangements contemplated in the agreement a joint standing commission is to be set up which is to meet periodically in London or Stockholm.

Unattended Generating Plant

A 184-kW alternator driven by a seven-cylinder 266-BHP 600-RPM oil engine is being installed by W. H. Allen, Sons & Co., Ltd., in a remote unattended power station in a South African mining district. An automatic electric system has been included which not only stops the engine before damage can be sustained owing to a fault, but also gives distant warning of the occurrence and evidence of the nature of the fault.



Bull-pull device attached to engine fuel cut-off lever

Nine contingencies are provided for. Excessive temperatures in alternator windings, lubricating oil and cooling water cause thermostats to close electrical tripping circuits. Deficiencies in cooling water and in lubricating-oil pressure are guarded against by inserting an adjustable-flow monitor meter with electrical contacts in the water outlet, and a monitor alarm in the oil supply to the principal bearings. Protection against reverse-power, over-voltage and electrical overload is given by contacts embodied in the alternator switchgear. A centrifugal switch (driven from an extension of the exciter shaft) having an arm floating between two contacts deals with over or under speeds.

When an abnormal condition exists, the appropriate circuit is completed through the drop relay on the alarm panel and a tripping relay in the alternator switch. Red lamps fed from a 24-V battery are controlled by the drop relays and indicate the circuit in which the fault has occurred. The opening of the alternator circuit-breaker interrupts the current to the alarm, and at the same time, by means of an additional contact, energises an electro-magnet in a "Bull pull" device to release a weight which acts on the fuel cut-off lever on the engine, thus shutting down the latter. As soon as the exciter voltage falls, a relay is released, making a contact in the battery circuit which sounds a horn.

Scottish Electricians' Wages

The Electrical Contractors' Association of Scotland (Central Board) points out that the addition of 5s. 10d. a week on account of the increase in the cost of living accorded to members of the Electrical Trades Union by an agreement between the Union and the National Federated Electrical Association, relates only to England. Electrical contractors' wages in Scotland are regulated by agreements between the Trades Union and the Scottish Association. The increase at present in force is one of 1d. per hour as a war bonus over the standard rate of 1s. 7d. which was in force at the beginning of the war.

Iron and Steel Control

The Minister of Supply has issued Direction (No. 2) dated December 22nd, 1939, under the Control of Iron and Steel (No. 4) Order, 1939, which came into operation as from January 1st. This supersedes the Direction (No. 1) issued at the same time as the No. 4 Order. The main features are that the exemption of pre-war contracts from the requirement of a licence disappears and in future deliveries under such contracts will be subject to the licensing provisions of the Order and, except in the case of departments of the United Kingdom Government, the existing exemptions from licence have been restricted to purchasers of materials for use in the United Kingdom. In addition, purchases of home iron ore, pyrites ash, burnt pyrites residues and boot and shoe grindery for use in the United Kingdom have been exempted from licence. Amendments have also been made in the provision for sale and purchase of small quantities of material without a licence. Eight additional related price schedules of iron and steel products have been deposited.

Street Lighting Specification

In announcing the issue of B.S./A.R.P.37 covering the new permitted lighting fitting referred to in our last two issues, the British Standards Institution states that it is considered that by allowing each manufacturer to evolve his own design to suit his particular production facilities the placing of suitable fittings on the market will be expedited more than would be the case if all manufacturers had to adapt their tools for the production of a rigidly standardised design. At the same time steps must be taken to see that this freedom is not abused by the production of fittings which do not strictly conform to the Specification. It is an essential feature of the Specification that the fittings must bear the certification mark registered by the British Standards Institution. This mark may only be used by those to whom licences have been granted by the B.S.I., and licensees are required to maintain strict control over their production to ensure that every marked fitting is in conformity with the approved sample. The licensing scheme applies also to lighting authorities who may desire to adapt or convert their existing lanterns so as to bring them into conformity with the Specification. An approved and certified fitting, however, will not in itself provide a satisfactory lighting installation. The fittings must be mounted at the proper heights on columns correctly spaced. The Specification gives instructions regarding the ranges of mounting heights and spacings for which the standard fittings are suitable, and these must be strictly followed. Copies of the Specification may be obtained from the Institution, 28, Victoria Street, London, S.W.1, price 6d. (post free 8d.).

Christmas Window Display

With the curtailment of shop window lighting as a result of "black-out" regulations, the opportunities for window dressing have naturally been restricted, and more particularly electrical displays. The London Electric Supply Corporation, Ltd., however, overcame these difficulties during the busy Christmas season by arranging a seasonal display of Hotpoint electrical appliances at its Lewisham and Deptford showroom. The principal feature of this arrangement was that it was an example of how a permanent display can be installed in showrooms in evacuated areas where protection of windows against splintering is important, and where a display facing the street cannot be conveniently seen. The back of the display was, therefore, placed against the window and faced the inside of the showroom, and so could be well lighted throughout the day. A suitable notice was placed on the outside of the window inviting potential customers to "Come in and inspect the display of Christmas presents."

Christmas display of Hotpoint appliances at the Lewisham & Deptford showroom of the London Electric Supply Corporation

Fatalities

An inquiry into the death of a servant girl by electrocution was conducted by Sheriff-Substitute More at Cupar, Fife. The girl's employer stated that he found the girl lying on the floor. In her left hand she held an electric fire and in her

right hand she was holding an electric lamp by the metal bracket. Neither the fire nor the light was switched on. Thomas Hunter, electrical engineer to the Fife Electric Power Co., said he had made tests with the fire and the lamp and found both of them to be in perfect order. Inside the lampholder, however, he found traces of a liquid. Similar signs were found in the base of the switch on the lamp, and the bulb being slightly slack it would have been possible for a liquid to have dropped on to the bulb and passed into the metal holder. In his opinion, the current must have passed from the lampholder, through the body of the deceased, to the fire.

Medical evidence indicated that death must have been instantaneous and was due to an electric shock. In his verdict the Sheriff said that the cause of death was the presence in the socket of the reading lamp of some moisture, there being insufficient evidence to show how it came there.

While engaged on research work with electrical apparatus at Liverpool University recently, Dr. H. J. Walke, demonstrator in the Department of Physics, received a severe electric shock. He failed to recover consciousness and died before he could be taken to hospital. At the inquest at Liverpool on December 23rd, it was stated that Dr. Walke was working with a valve oscillator supplied with DC which could be varied up to 12,000 V. It was suspected that Dr. Walke must have been on the point of leaving the cubicle when he slipped or overbalanced, and in order to avoid the delicate apparatus he was handling, raised his hand and touched the AC supplementary supply to the resistance mats. In slipping he must have shorted the 230-V supply. A verdict of "Accidental death" was returned.

Aluminium Utensils

In view of the shortage of aluminium for other than Service requirements, it is interesting to hear from Bulpitt & Sons, Ltd., that they have stocks of the metal which should carry them over several months yet, and that they are still accepting orders for aluminium electric kettles, percolators, ground-base stewpans for electric cooker hot plates, etc.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, ETC.	Price January 3rd.	Fortnight's inc. or dec.
a Acid oxalic ... ... per cwt.	Suspended	—
a Ammoniac, Sal ... ... per ton		—
a Ammonia, Muriate (large crystal)... ,,		—
a Borax... ... ... ,,		—
a Copper, Sulphate ... ... ,,		—
a Potash Chlorate ... ... per lb.		—
a ,, Perchlorate ... ... ,,		—
a Shellac ... ... per cwt.		—
a Sulphur, Commercial ... ... per ton		—
a ,, Roll ... ... ,,		—
a Soda, Chlorate ... ... per lb.		—
a ,, Crystals ... ... per ton		—
a Sodium, Bichromate, casks ... per lb.		—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£110	—
b ,, Wire ... ... per lb.	1/3 to 1/9	—
b ,, Sheet and Foil ... ,,	1/6 to 2/9	—
p Babbits Metal and Anti-friction Metals —		
Grade I ... ... per ton net	£197	—
Grade II ... ... ,,	£137	—
Grade III ... ... ,,	£73	—
c Brass (rolled metal 2" to 12" basis)... per lb.	9¼d.	—
c ,, Tubes (solid drawn) ... ... ,,	1/1¼ to 1/1½	—
c ,, Wire, basis ... ... ,,	10¼d.	—
c Copper Tubes (solid drawn) ... ,,	1/2½d.	—
g ,, Bars (best selected) ... per ton	£95	—
g ,, Sheet... ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£62	£11 inc.
d ,, ,, Wire Rods ... ,,	£65.10s.	£10.10s. inc.
d ,, ,, H.C. Wire ... per lb.	9⅝d.	1⅛d. inc.
f Ebonite Rod ¼" dia. & up ... ... ,,	1/10to2/3 +10%	—
f ,, Sheet ⅛" thick & up ... ,,	1/4 to 1/8 adv.	—
n German Silver Wire, Nos. 1 to 12... ,,	2/5	—
h Gutta-percha, fine ... ... ,,	Nom.	—
h India-rubber, Parafine ... ... ,,	1/1	—
g Lead, English Pig ... ... ,,	£26.10s.	—
g Mercury ... ... per bot.	Nom.	—
e Mica (in original cases) small ... per lb.	1/3 to 3/-	—
e ,, ,, ,, medium ... ,,	9/- to 18/-	—
e ,, ,, ,, large ... ,,	20/- to 27/6	—
p Phosphor Bronze, plain castings ... ,,	1/2½	—
p ,, ,, drawn bars & rods ,,	1/3½	1½d. inc.
p ,, ,, rolled strip & sheet ,,	1/1½	1d. inc.
p ,, ,, wire ... ... ,,	1/3½	1d. inc.
o Platinum ... ... per oz.	£10	—
d Silicium Bronze Wire ... ... per lb.	8¼d.	—
g Spelter ... ... per ton	£25.15s.	£10.15s. inc.
g Tin, Block (English) ... ... ,,	£246.5s.	£11.5s. dec.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	4/9	6d. inc.

Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g Henry Gardner & Co., Ltd.
h Edward Till & Co.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead, rubber, tin and spelter, up to the time of going to press, are given in this section under the same heading.

Long-service Employees

The Midland Electric Manufacturing Co.'s Social and Athletic Club held their annual dinner and dance at Tony's Ballroom, Birmingham, on December 19th. Despite the difficulties under which the organisers have had to work over 500 employees were present, including several on leave from the Forces. The gathering was presided over by Mr. W. L. Barber, managing director and founder of the company. After the dinner the usual presentations of illuminated addresses and gold watches for long service took place. On this occasion

M.E.M. students who received gifts at the company's annual dinner and dance

three employees received illuminated addresses, having completed twenty-one years' service with the company, and twenty-nine others were presented with gold watches as a token of appreciation of ten years' service. The total number of gold watches awarded under the scheme is now 209. Mr. Barber also made personal gifts to sixteen students who had made outstanding progress at evening classes, four having obtained National Certificates in Electrical Engineering.

Winding-up Petition Dismissed

In the Companies Court, Chancery Division, on December 21st, Mr. Justice Simonds dismissed a petition for the compulsory winding-up of Architectural Constructional & Electrical Utilities, Ltd. It was stated on behalf of the company that the parties had agreed terms.

"Distribution"

Henley's have reconsidered their decision to suspend the publication of their "Distribution of Electricity" and it is now to reappear as a quarterly instead of monthly. The first of the new series is well up to standard and is welcome as a sign of the company's determination to carry on its normal activities.

Domestic Science School

The London School of Electrical Domestic Science is re-opening to-day (Friday). Further information can be obtained from the Principal, Imperial Court, 2, Basil Street, Knightsbridge, S.W.3.

Trade Announcements

Gee Electric has taken premises at 15, Little Newport Street, W.C., and asks for manufacturers' literature.

The Leeds branch of Falk, Stadelmann & Co., Ltd., has been removed to 50, Wellington Street, Leeds. The telephone numbers are unchanged.

Street Lighting Enterprise

The General Electric Co., Ltd., has recently completed two conversions of street lighting to its latest designs. These, it is considered, will enable new street lighting to be quickly adopted. The first installation has been made in Ealing, where 65 units on steel columns have been fitted in Pope's Lane and Gunnersbury Avenue. "Birchfield" plate refractor lanterns have been used in Pope's Lane, while in Gunnnersbury Avenue side entry "Difractor" lanterns have been installed. Both are for use with 250- and 400-W "Osira" lamps. The other installation has been carried out in a central area under the auspices of the Holborn Borough Council, in Bloomsbury Way and Hatton Garden. This comprises steel column standards on which have been erected "Wembley" lanterns using 1,500-W "Osram" lamps. The glassware has not been fitted in this case as it is expected that the modified street lighting units will shortly replace them on the lantern bodies. It is hoped that a few experimental fittings will be in service by the end of this week.

Motors for South Africa

The note in our last issue asking for offers from British manufacturers for the supply of cables, etc., to Australia included electric motors. The inquiry for the latter, however, was from South Africa. We shall be pleased to pass on the names of interested firms to our correspondents.

An Unusual Switch Explosion

At an inquest at Sheffield into the death on December 21st of two men at the Grimesthorpe works of the English Steel Corporation, the jury returned a verdict that the fatal injuries were accidentally caused by an explosion of vaporised oil in a switch due to a flash from a short-circuit between two of the incoming 11-kV supply leads. This finding was in accordance with the evidence of Mr. L. H. Crowther, the chief electrical engineer, who stated that the explosion in the switch tank had wrecked its top cover. The furnace, he said, had been in regular use for two years and nothing had gone wrong previously. The switch, which was of a modern type, had been examined less than a month before.

The chief melter reported that he had opened the 11-kV switch in order to make dead a two-ton furnace. The switch operated normally, and the flash and explosion occurred as he walked away. The coroner expressed the opinion that there was no question of negligence or breach of the supply regulations.

Brussels International Fair

The war is not to interfere with the holding of the Brussels International Industries Fair from March 6th to 17th. The exhibits will be housed in eleven halls and there will be about 2,700 stands. These products and their makers are dealt with in a "Belgian Review of International Trade" published in seven languages.

Roller Bearings

British Timken, Ltd., is now publishing the "Timken Times," and the second number, which we have just received, contains interesting illustrated notes giving details of plant employing the company's tapered roller, ball, and parallel roller bearings.

Price Increases

Brookhirst Switchgear, Ltd., announce that owing to the continued rise in costs they are increasing the advance of 7½ per cent. made in September last to 12½ per cent. upon all their prices. The new prices will be operative in respect of all orders received on and after January 1st. Orders will, however, be accepted against valid outstanding quotations for a period of fourteen days.

Oldham & Son, Ltd., engineers and storage battery makers, announce that they have had to advance further all their omnibus and spares prices by 15 per cent.

English Electric A.R.P. Workers

Further English Electric A.R.P. badges and first-aid certificates, for which employees of the English Electric Co., Ltd., have qualified in connection with the works A.R.P. scheme, were recently presented in the board room of the company at Stafford. The presentations were made by Miss M. J. Nelson (daughter of Mr. G. H. Nelson, chairman and managing director of the company). Mr. J. W. C. Milligan, assistant to the general manager, introduced Miss Nelson, and indicated the very valuable work she was doing for the country in organising canteens for the troops. Over 600 employees had received anti-gas or first-aid training, and further classes were proceeding. He paid tribute to the instructors, Dr. Brice, Mr. Clewes, Mr. Lear and Miss Emberton, as well as to the A.R.P. Officer, Mr. Stanier. Miss Nelson handed a packet containing the badges to Mr. Milligan, and afterwards presented the first-aid certificates individually.

Food Research

With the rationing of food there is more demand than ever from housewives for guidance on food matters. The Electrical Association for Women Electrical Housecraft School continues to carry out research on foods available under the new conditions and in the January issue of "Cheerful Economy" concentrates on the use of unrationed foodstuffs, as well as pointing out how to make the best use of electrical facilities available.

Calendars and Diaries

B. S. & W. Whiteley, Ltd., have again sent us their handy desk calendar, the monthly slips of which bear quotations.

Illustrations of the company's products appear on the wall calendar of Crofts (Engineers), Ltd., which has monthly sheets.

The monthly sheets of the calendar of H. Cedric Neale & Co. are printed in clear type.

The Portable Furnace & Patents Co. has sent us a handy engagements calendar (one month to a sheet) for hanging on the wall.

We have received from Francis Polden & Co., Ltd., an "At-a-Glance" calendar, each monthly slip of which also gives the calendar for the year.

Mr. George Barnard has sent us a neat pocket diary in a dark brown leather binding, and also a refill for his desk calendar.

A handy "Reminders for 1940" pad has been received from Litholite Insulators and St. Albans Mouldings, Ltd.

The calendar of Earles' Cement has large monthly sheets and covers the years 1940, 1941 and 1942.

Illustrations of the company's cooling towers appear on the calendar of the Davenport Engineering Co., Ltd., which has daily slips.

The calendar of Bull Motors (Branch of E. R. & F. Turner, Ltd.), is mounted on a strong card, the principal colours of which are blue and gold, with a picture of one of the company's motors in the centre. The monthly slips also show the preceding and following months. The value of the calendar is increased by technical information relating to the installation and maintenance of Bull motors, which is printed on the back of the card.

The calendar of Robey & Co., Ltd., has large monthly slips showing the preceding and following months. Between each slip is an illustration of one of the company's products.

The Revo Electric Co., Ltd., has again sent us a calendar with daily tear-off slips, each of which bears a quotation. The slips are mounted on a strong card which shows the calendar for the year.

The calendar of T. J. Grainger & Co., Ltd., has daily slips with bold figures in red.

The Automatic Telephone & Electric Co., Ltd., has sent us a neat propelling pencil in a red case, together with refills.

The large monthly sheets of the calendar of Pope's Electric Lamp Co., Ltd., are attached to a strong board advertising "Elasta" lamps.

A picture of Pillar Mountain from Boat How makes an effective picture for the calendar of McClure & Whitehead, which has monthly slips.

The Hackbridge Electric Construction Co., Ltd., and the Hewittic Electric Co., Ltd., have sent us a useful chromium-plated paper knife and also a refill for their engagement pad.

An excellent photograph of a battleship, which has the appropriate title of "The Silent Service," has been selected by Bennie Lifts, Ltd., for their calendar, which has monthly slips.

The calendar of Mr. Samuel Baxter has large monthly sheets with bold figures.

M. & C. Switchgear, Ltd., has sent us a monthly calendar, with white figures on a blue background.

We wish to thank our many readers who have sent us the season's greetings, which we heartily reciprocate.

"Contact"

S. O. Bowker, Ltd., have sent us a copy of the first issue of their house journal, "Contact," which is being produced with the object of maintaining contact with their customers. The Christmas issue, in addition to containing seasonal greetings and a number of amusing stories, reviews some of the contracts obtained by the company during the past year.

Electrical Control Gear

Donovan Electrical Co., Ltd., Safuse Works, Northcote Road, Stechford, Birmingham, has sent us a well-produced catalogue containing 170 pages which deals comprehensively with the company's wide range of control gear. It is profusely illustrated and in addition to giving details of products includes a number of useful definitions, tables, dimension sheets, etc.

New Catalogues and Lists

Hanovia, Ltd., Slough.—A folder describing the "Sollux 400" home model infra-red ray lamp, a table pattern of which is now available.

Multi-Ray Heaters, Ltd., 40-43, Chancery Lane, London, W.C.2.—A leaflet describing the company's new electric unit heaters for industrial purposes.

British Thomson-Houston Co., Ltd., Crown House, Aldwych, London, W.C.2.—An illustrated list relating to the company's new A.R.P. street-lighting unit.

Nathan & Allen, Ltd., 131, Victoria Street, London, S.W.1.—A leaflet describing electrically wound time switches for up to 60-A air break and 600-A oil break.

Sun Electrical Co., Ltd., 118-120, Charing Cross Road, London, W.C.2.—List No. 704, giving particulars of A.R.P. lighting fittings for shop windows, entrances, &c.

British Timken, Ltd., Cheston Road, Aston, Birmingham.—A brochure dealing with the application of tapered roller bearings to machine tools.

Graham Farish, Ltd., Bromley, Kent.—A leaflet dealing with the new "Swallow" fire.

Klaxon, Ltd., 201, Holland Park Avenue, London, W.11.—A folder giving the latest technical information and prices of Klaxon sirens and control gear especially suitable for air-raid warnings. Diagrammatic sketches assist in the selection of control gear for any locality.

Information Department

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, &c., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

UPAT plugs.
JUBILEE soldering iron.
JUBILEE armour clamp.

ELECTRICITY SUPPLY

Large Croydon Rate Contribution. Rural Development in Kirkcudbrightshire. Extensions at Battersea Power Station. Local Generation v. Bulk Supply at Lyme Regis

Birkenhead.—PLANT REQUIREMENTS IN 1942.—The C.E.B. has notified the Electricity Committee that the maximum demands in 1942, upon which the necessity for the new Birkenhead generating station was based, were likely to be substantially lower than anticipated. The Board expresses the hope that it will be possible early next year to arrive at more accurate estimates of loads for which the plant should be provided in 1942. It has authorised negotiations for an option on the site to proceed and has accepted responsibility for all expenses incurred by the Corporation in connection with the new station.

Bolton.—CENTRAL CONTROL OF LIGHTING.—The Lighting Committee has instructed the superintendent to proceed with the installation of a central control system for electric street lighting.

Brentford and Chiswick.—INSTALLATIONS IN WARDENS' POSTS. Regarding the paraffin lamps at present used as unsatisfactory, the Council has decided to equip all wardens' posts with electric lighting and heating.

Cheltenham.—SUPPLY EXTENSIONS.—The Electricity Committee is applying for permission to borrow £600 for the provision of a supply to Kayte Farm and £225 for a supply to Boddington.

Croydon.—£24,000 RATE CONTRIBUTION.—The Electricity Committee reports a surplus for 1938-39 of £42,390, of which £24,000 is to go to the relief of rates. The previous year's surplus was £70,347.

Epsom and Ewell.—HIGHER CHARGES.—Except where a fuel clause is operative the present tariffs, including both fixed and "unit" charges, are to be increased by 25 per cent.

Finchley.—INCREASED CHARGES.—The Council has authorised increases in electricity charges. Among other changes the lighting flat rate is to be raised from 4½d. to 6d. per kWh and the domestic and commercial power and heating rate from 1d. to 1½d. per kWh.

Grimsby.—SITE FOR SUB-STATION.—The Electricity Committee has obtained a site in Hewitt Avenue for a sub-station.

Isle of Axholme.—SUPPLY TO COUNCIL HOUSES.— The Rural District Council is to give a supply of electricity to Council houses at Gunthorpe and Wroot.

Jarrow-on-Tyne.—HOSPITAL INSTALLATION.—The Town Council has approved estimates by the borough engineer for installing electric lighting at the Isolation Hospital, and has decided to obtain tenders for the work.

CABLE LAYING.—Plans by the North-Eastern Electric Supply Co., Ltd., for laying underground cables in Blackett Street have been approved by the Council.

Keighley.—ILLUMINATED KERBSTONES.—Two illuminated kerbstones have been designed by Mr. H. Webber, the Council's electrical engineer, made by his department, and installed at a pedestrian crossing as an experiment. The kerbstones are hollow concrete boxes with two slots through which light from electric lamps is emitted.

Kirkcudbrightshire.—RAPID DEVELOPMENT.—The convener of the Electricity Committee recently reported to the County Council that there had been an increase of 29 per cent. in electricity sold during the quarter ended November 15th, and the amount received was £8,934 as against £7,244. He claimed that the rate charged in the Stewartry, 1.67d. per kWh, was the lowest of any rural undertaking in the United Kingdom.

County of London Co.'s Charges

THE County of London Electric Supply Co., Ltd., has announced that certain of its tariffs are to be increased. Over 80 per cent. of the company's consumers are supplied under the two-part tariff, the "unit" charge of which is to be raised as follows:—London, from ½ to ¾d.; suburban areas, from ¾d. to ¼d.; and country areas, from ¾d. to 1d. The lighting flat rate is also to be increased, and the charges for small power supplies are to be raised by 20 per cent. No increases are contemplated in the standing charges under the business or domestic two-part tariffs.

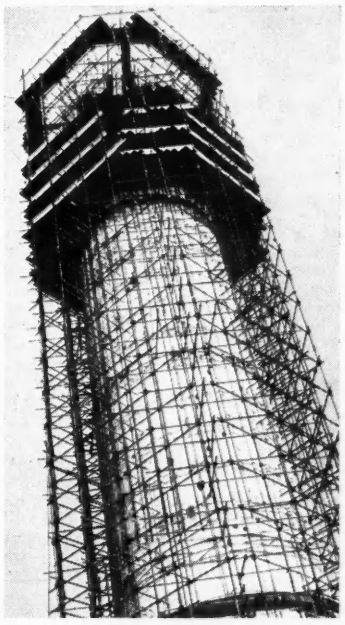
In announcing the increases the company states that the present unfortunate circumstances have brought a serious rise in costs. Also the restrictions placed on the company's activities by reason of the black-out (it normally lights over 600 miles of streets in the London area) and the compulsory expenditure for the protection of the company's works are material factors which have made the increases imperative. It is regarded as particularly unfortunate that the many schemes of development which were in hand at the commencement of hostilities have had to be suspended.

The associated companies in the Home Counties are making announcements of a similar nature.

London.—ST. MARYLEBONE.—In view of the fall in consumption the Electricity Committee recommends raising prices under various tariffs, including an increase from 4d. to 6d. in the lighting flat rate.

RATE CONTRIBUTION MOVE.—At a recent meeting of the Battersea Borough Council an effort was made to secure a contribution of £10,000 from the Electricity Department in aid of the rates. Councillor R. C. Kiloh, chairman of the Electricity Committee, stated that there was no reason why the suggestion should not go before the Committee, but he could not hold out much hope of its being followed.

BATTERSEA POWER STATION EXTENSION.—The scheme for the extension of Battersea power station is progressing steadily despite the difficulties caused by the outbreak of war. The original two reinforced concrete chimneys are now being joined by a third and eventually a fourth chimney will be erected. The chimney now in course of construction is being built to cope with the additional boilers and generating plant which form part of the extension scheme. Its internal diameter is 28 ft. 2 in. at its base, and 22 ft. 1 in. at the top, while the length of the shaft is 171 ft. and the height to the top is 352 ft. 6 in. O.D. The thickness of the shell at the base is 10 in., tapering to 9 in. at the bottom of the reeds or fluting. Upwards from this point the shell is 6 in. thick, with the reeds projecting 3 in., and at the top of the chimney above the concrete band the thickness of the shell is 4 in. The work is being carried out under the direction of Sir Leonard Pearce, C.B.E., D.Sc., M.Inst.C.E., Engineer-in-Chief, London Power Co., Ltd., and the contractors are John Mowlem & Co., Ltd.



New reinforced concrete chimney at Battersea power station

Lothians.—TARIFF INCREASE.—As from the meter readings for the first quarter of 1940 the running charge under the two-part tariff of the Lothians Electric Power Co. is to be raised from ¾d. to 1d.

Lyme Regis.—LOCAL GENERATION QUESTION.—Recently the Council applied to the Electricity Commissioners for consent to extend its generating plant. The Commissioners have asked for a further statement showing the comparative costs of local generation and partial bulk supply on the terms offered by both the Corporation of Bridport and the South Somerset & District Electricity Co. They suggest that the Council might consider the desirability of obtaining the advice of an independent authority.

Manchester.—NEW SWITCHGEAR.—The Electricity Committee is seeking sanction to borrow £6,000 for switchgear for the Stuart Street power station.

Mirfield.—10 PER CENT. PRICE INCREASE.—The Urban District Council has approved an increase of 10 per cent. in electricity charges.

Nottingham.—NO INCREASE IN ELECTRICITY CHARGES.—The price of electricity in Nottingham will not be increased in the near future. This assurance was given recently by Coun. F. Mitchell, chairman of the Electricity Committee. The Gas Committee has, however, decided upon a 5 per cent. increase in its charges.

Oldbury.—SHELTER LIGHTING.—The Town Council is to install a system of lighting by electric batteries in all schools shelters.

Oldham.—SALES IMPROVE.—Consumption of electricity in Oldham last month increased by nearly a million kWh compared with a year ago, despite the fact that the demand for traction was down by 22,600 kWh. Thirty-five cookers and eleven wash-boilers were supplied on simple hire during the

month, making the total numbers on circuit: Cookers, 3,922; and wash-boilers, 2,495.

LOAN SANCTIONS.—The chairman of the Electricity Committee stated at last week's meeting that the Electricity Commissioners had intimated that they would agree to borrowing powers for mains (£4,000), transformers (£2,000), switchgear (£4,629), and would communicate later about the £46,435 previously sanctioned for switchgear extensions at Chadderton power station.

Rawtenstall.—RESUMPTION OF HIRE-PURCHASE FACILITY.—Subject to suggested reductions in the repayment periods the Electricity Committee has decided to resume the sale of electrical apparatus on hire-purchase terms.

Rotherham.—POWER STATION PLANT.—At the last meeting of the Electricity Committee the electrical engineer reported that he expected shortly to receive instructions authorising work to proceed on the boiler-house building and certain ancillary equipment.

Sheffield.—SCHEME FOR MODIFIED LIGHTING.—The Watch Committee has recommended the adoption of modified street lighting. The scheme was strongly recommended by Mr. J. F. Colquhoun, public lighting engineer, who has been closely concerned with the national experiments.

Southend-on-Sea.—INCREASED CHARGES.—Revised estimates for the year ending March 31st next presented at the last meeting of the Town Council showed an anticipated deficit of £38,870 on the electricity undertaking as compared with the original estimated deficit of £4,130. In view of this the Council agreed to alter the charges Various revisions are made in the different tariffs, but for general supplies the increase is 15 per cent.

Swansea.—ABOLITION OF FLAT RATE.—Last week details were given of tariff changes approved by the Electricity Committee, including the abolition of the domestic heating flat rate. In a notice to consumers it is pointed out that while the tariff revision has been necessitated by the increased cost of commodities, the prime object of the Corporation is to assure the payment by all consumers of an equitable proportion of the standing charges incurred in the production and distribution of energy. Accordingly, the domestic rateable value tariff, with a ½d. per kWh running charge, remains unaltered. Except in a limited number of special cases, a benefit will now accrue to all domestic consumers using electricity for lighting and heating, or cooking, by transferring to the rateable value tariff, and transfer to this tariff will also benefit almost all consumers using electricity for lighting only. A table gives the minimum annual consumptions necessary in order to benefit by transfer to the rateable value tariff. These range from 66 kWh for dwellings of £8 rateable value to 270 kWh for houses of £40 r.v.

Whitworth.—SUPPLY TO MILLS.—To provide a supply amounting to 200 HP to Bridge End Mill the Electricity Department is applying for permission to borrow £400. Furthermore, an anticipated additional load of 200 HP at the Orama Mill will make it necessary to lay a new high-voltage cable at a cost of approximately £250. Negotiations are proceeding with Heys Bros. & Sanderson, whose requirements are likely to necessitate the provision of a transformer and switchgear at a cost of £229.

Wigan.—SCHEME POSTPONED.—The Lancashire Electric Power Co. has informed the Rural District Council that owing to the war it is unable at present to extend the supply to Elmers Green, Dalton.

COMMUNICATIONS

Germany.—TELEPHONY.—According to the *Journal des Télécommunications*, at the end of March last there were 4,556 automatic and 5,451 semi-automatic or manually operated telephone exchanges in Germany. The number of telephone subscribers in the country is given as 2,370,000, over 60 per cent. of whom were served by the automatic system. Telephone instruments in use numbered 4,052,000 and public call boxes 94,000, these figures comparing with 3,537,000 and 87,000, respectively, at the end of March, 1938. The number of inter-urban telephone lines in Germany increased during the twelve months from 48,779 to 55,232. On the other hand, the number of international circuits declined from 658 to 581.

Great Britain.—RADIO RELAY SYSTEM FOR SMETHWICK.—The Smethwick Corporation Emergency Committee has given permission for British Relay Wireless, Ltd., to install a broadcast relay system.

RENTED TELEVISION BY WIRE PROPOSED.—Mr. S. Sagall, managing director of Scophony, Ltd., has prepared a memorandum containing proposals for the relaying of television programmes over the telephone wires. He thinks that such a system could be operated on an inclusive rental basis at a charge of 5s. per week to subscribers. This country has held the lead in television so far, but the total cessation of the service will, he fears, allow the leadership to pass to the United States, where development is being actively pursued. The memorandum also refers to the possibility of introducing television into cinemas.

TRACTION

L.N.E. Railway.—MANCHESTER-SHEFFIELD ELECTRIFICATION.—Although all the contract work in connection with the electrification of the line from Manchester to Sheffield is to be finished, the completion of the scheme is to be deferred. The project concerns just over 74 route miles and 292 miles of track, and was the first true main-line electrification scheme in Great Britain. About half the civil engineering work has been completed, and several miles of overhead equipment to carry the 1,500-V transmission wires has been erected. When the scheme is eventually completed all freight and passenger trains will be hauled by electric locomotives, except for certain passenger services to be run by self-contained multiple-unit electric trains.

Rotherham.—NEW TROLLEY-BUS SERVICE.—The Transport Committee is to introduce a trolley-bus service direct from Maltby to Templeborough, the regional transport commissioner having signified his approval.

London Joint Authority

Revised Charges : New Switchgear at Kingston : Sale of Twickenham Plant

TO meet an anticipated deficit of £67,150 (revised figure) for the year to December 31st, 1940, the London and Home Counties Joint Electricity Authority recently proposed to the Electricity Commissioners (i) that the redemption period of loans for the purchase of undertakings should be extended; or (ii) that the redemption provisions should be suspended for one year to such an extent as to reduce the amount required from £271,440 to £100,000. The Commissioners expressed their inability to agree to either of the proposals, but asked for revised estimates amended to bring about a balancing of income and expenditure.

This can only be effected by an increase of charges and the Emergency Committee of the Authority has accordingly submitted a schedule of revised charges which, it is anticipated, will result in a surplus of £6,350. The new charges will take effect after the March meter readings. While all the flat rates will be raised, it is proposed to increase only the fixed charges of the domestic, business and power two-part tariffs. In the case of the domestic tariff the increase is about one-third upon the existing standard rates, but as all the new charges embody the general 10 per cent. increase imposed a year or so ago the actual increase is somewhat lower. It is proposed that meter rentals charged to quarterly lighting consumers shall be abolished as a separate charge.

The Emergency Committee has reported that at a meeting held at the Guildhall, Kingston-upon-Thames, on November 23rd at which representatives of the Kingston Corporation, the Central Electricity Board, the General Electric Co., Ltd., and the Authority were present, it was agreed that the above-mentioned undertakings should be recommended to place the contract for the new switchgear at the Kingston generating station to replace that destroyed by the fire in December, 1938, with the General Electric Co. on the terms of the lowest tender received for the switchgear, subject to:—(a) Any established increase since the date of the offer of the General Electric Co. to carry out the work at such price, namely, August 3rd, 1939; (b) any further increases that may have arisen between that date and the date of placing the contract as may be agreed with B.E.A.M.A. and generally; and (c) subject to the inclusion in the contract of a "War Variation Clause" dealing with the adjustment of costs following the outbreak of war when such clause is settled by the Central Electricity Board with B.E.A.M.A. It was also agreed that in consideration of such contract being placed with the General Electric Co. each of the parties would recommend that a total sum of £3,250 should be paid to the company in respect of the loan on hire by them of the temporary switchgear at the Kingston generating station, such amount to cover the total amount due for the hire of the temporary switchgear from the date of its installation until it is replaced by the permanent switchgear.

The Committee also reported that, in view of the difficulty in securing competitive or fixed prices for annual contracts in existing circumstances, it had given instructions for inquiries to be made from existing contractors and from other firms as to the terms upon which they would be prepared to supply specific quantities estimated to cover the Authority's requirements for six or twelve months.

The Committee recommended the acceptance of a tender for the purchase of the Authority's Twickenham generating plant.

The question of bringing back from Burford all or part of the London staff to London has been discussed and it has been decided to defer decision for three months.

NEW PATENTS

Electrical Specifications Recently Published

Compiled by a firm of chartered patent agents. The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1937

25253. "Armoured electric cables." I. D. Barr (O. P. Wessel). October 17th, 1938. (515416.)

1938

4709. "Road-lighting systems." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. February 18th, 1937. (515418.)

5071. "Gas- or vapour-filled electric-discharge tubes." N. S. Oerensofi. February 18th, 1938. (515419.)

6724. "Electric-discharge signs." E. L. Mays. March 3rd, 1938. (515613.)

6913/6914. "Gas- or vapour-filled electric-discharge tubes." N. S. Oerensofi. March 5th, 1938. (515615/514464.)

6917. "Method of applying fluorescent materials to electric-discharge tubes." N. S. Oerensofi. March 5th, 1938. (515465.)

13179. "Time element electric relays." Siemens & General Electric Railway Signal Co., Ltd., J. E. Candler and E. R. Colley. May 3rd, 1938. (515473.)

13258. "Television transmission systems and the like." W. A. Beatty. May 4th, 1938. (515474.)

13259. "Television pulse-generating systems and the like." W. A. Beatty. May 4th, 1938. (515475.)

13639. "Detection of the position of objects by electro-magnetic rays." E. G. H. Mobsby and R. C. G. Slazenger. May 6th, 1938. (515567.)

15815. "Light-diffusing means for lamps." W. J. H. Challis and Walmsley Patent Lamp Co., Ltd. May 26th, 1938. (515476.)

16022. "Means for attaching flexible conductors to electric plug couplings or like devices." Belling & Lee, Ltd., and A. G. Haslam. May 30th, 1938. (514480.)

16040. "Television receivers." Ferranti, Ltd., M. K. Taylor and H. Wood. May 30th, 1938. (515426.)

16195. "Television and like systems." C. L. Faudell. May 31st, 1938. (515427.)

16201. "Overload device for lifts." Wylie Safe Load Indicators, Ltd., and H. N. Wylie. May 31st, 1938. (515520.)

16218. "Application of luminescent coatings to electric-discharge tubes, and electric-discharge tubes resulting therefrom." Neonelectric Co., Ltd., and S. W. Wilkins. May 31st, 1938. (515522.)

16243. "Electron multipliers." Standard Telephones & Cables, Ltd. June 23rd, 1937. (515525.)

16291. "Electric apparatus for automatic control of a variable condition." A. M. Stewart, H. M. Jack and M. Widgery (legal representatives of J. G. Stewart, deceased). May 31st, 1938. (515484.)

16298. "Cooling means of dynamo-electrical machinery." H. West and Metropolitan-Vickers Electrical Co., Ltd. May 31st, 1938. (515527.)

16300. "Control systems for electric-, gas- or vapour-discharge valves connecting a load circuit to an alternating-current supply." British Thomson-Houston Co., Ltd. June 2nd, 1937. (515528.)

16308. "Electro-magnetic relays." Automatic Telephone & Electric Co., Ltd., T. R. Rayner and A. O. Maring. May 31st, 1938. (515529.)

16326. "Trip-operated electric switches." J. A. Crabtree & Co., Ltd. (Schiele Industriewerke). June 1st, 1938. (515432.)

16345. "Voltage-stabilising devices for electric supply systems." E. L. C. White and H. L. Mansford. June 1st, 1938. (515435.)

16429. "Trunk communication electric lines, without metallic sheathings, for trunk communication installations movable in position." Siemens & Halske Akt.-Ges. June 30th, 1937. (515443.)

16462. "Vehicle headlamps." J. J. V. Armstrong (R. Bosch Ges.). June 2nd, 1938. (515445.)

16556. "Control systems for arrangements employing electric-discharge devices." British Thomson-Houston Co., Ltd. June 2nd, 1937. (515537.)

16607. "Wireless receiving apparatus." F. J. G. Van Den Bosch. June 2nd, 1938. (515569.)

16689. "Electric oil circuit-breaker with instantaneous reclosure." Forges & Ateliers de Constructions Electriques de Jeumont. June 4th, 1937. (515542.)

16699. "Electrical generators." Allen West & Co., Ltd., and J. Bunyan. June 3rd, 1938. (515571.)

16739. "Electrical inductance devices." Marconi's Wireless Telegraph Co., Ltd., F. M. G. Murphy and C. D. Colchester. June 3rd, 1938. (515545.)

16741. "High-frequency amplifier arrangements." Marconi's Wireless Telegraph Co., Ltd., and G. N. Coop. June 3rd, 1938. (515546.)

16775. "Shielding and mounting of electrical apparatus such as thermionic valves." Standard Telephones & Cables, Ltd., S. G. Knight and G. Newton. June 3rd, 1938. (515551.)

16776. "Electron-discharge devices." Standard Telephones & Cables, Ltd., and W. R. Moscrib. June 3rd, 1938. (515552.)

16837. "Voltage regulators for alternating current." Switchgear & Cowans, Ltd., G. H. Neep and D. Firth. June 7, 1938. (515626.)

16887. "Ignition systems for internal-combustion engines." Bendix Aviation Corporation. June 10th, 1937. (515580.)

16894. "Thermionic valve amplifiers." Telefunken Ges für Drahtlose Telegraphie. June 5th, 1937. (515583.)

16896. "Radio receivers." Telefunken Ges. für Drahtlose Telegraphie. June 4th, 1937. (515584.)

16923. "Electron-discharge devices." Standard Telephones & Cables, Ltd., A. I. Vangeen and J. H. Watling. June 7th, 1938. (515586.)

16960. "Dynamo-electric machines." Newman Industries, Ltd. (Stephen Ges., K. & A.). June 7th, 1938. (515589.)

17001. "Circuit-control arrangements of electro-magnetic switches." H. J. Osborn & Sharp. June 8th, 1938 (cognate application 36661/38). (515630.)

17029. "Production of ceramic dielectrics." Steatite & Porcelain Products, Ltd., and N. O. Clark. June 8th, 1938. (515633.)

17068. "Piezo-electric devices." British Thomson-Houston Co., Ltd., L. B. Ault and W. A. Bocock. June 8th, 1938. (515636.)

17082. "Electrical frequency-selective systems." J. Robinson. June 8th, 1938. (515640.)

17471. "Cordless electric irons and heating arrangements therefor." A. J. Gunn and Dowsing Co. (Electrical Manufacturers), Ltd. June 13th, 1938. (515593.)

17590. "Telephone instruments." General Electric Co., Ltd., and A. Warrington. June 14th, 1938. (515594.)

18055. "Radio receiving sets." Standard Telephones & Cables, Ltd. (R.F.L. Andriesens). June 17th, 1938. (515597.)

18361. "Thermally operated overload relays." G. O. Donovan. June 21st, 1938. (515602.)

18438. "Electric radiators." G. J. Berry and C. A. Painton. June 21st, 1938. (515643.)

18499/18500.) "Terminal fittings of trolley conductors for electric traction." T. M. Watson. June 22nd, 1938. (515556/515557.)

18504. "Electric heating means for warming and airing beds." F. Binns. June 22nd, 1938. (515559.)

18537. "Electric heating devices." General Electric Co., Ltd., and G. S. Cattell. June 22nd, 1938. (515560.)

18624. "Thermal cut-outs for electrically heated liquid containers." Taylor & Wilson, Ltd., A. Kennedy and J. George. June 23rd, 1938. (515647.)

18672. "Refractors for street lighting and other purposes." Holophane, Ltd., and S. English. June 23rd, 1938. (515651.)

18839. "Electric feeler controls for machine tools." E. F. Muller. June 24th, 1938. (515656.)

32769. "Oil-pressure-operated electric switch for motor vehicles and internal-combustion engines." S. C. Wayman. November 11th, 1938. (515461.)

1939

3857. "Apparatus for measuring magnetic flux." Fabrica Italiana Magneti Marelli. February 7th, 1938. (515662.)

TRADE MARK APPLICATIONS

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from the dates mentioned:—

December 20th

Ecl. No. 608908. Class 9 (IV). Selenium photo elements and the like scientific apparatus for transforming radiant energy into electrical energy or variations of electrical energy and rectifier plates and the like scientific apparatus for rectifying electrical current.—Evans Electroselenium, Ltd., Ibex House, Minories, E.C.3.

Lectragas. No. 609246. Class 11 (IV). Combination gas and electric appliances for use in heating and cooking, &c.—George Helps, Manor Court, Nuneaton.

December 27th

Champion (lettering and design). No. 604623. Class 7 (IV). Sparking plugs.—Champion Sparking Plug Co., Ltd., Great South-West Road, Feltham, Middlesex.

Development in France

In a report to the President of the French Republic, the Minister of Agriculture has given official statistics on the activity of the National Agricultural Credit Fund, purpose of which is to allow loans for rural electrification work. Since its creation in 1924 up to December 31st last, this fund has lent a total of 688,989,000 fr. Of this 89,099,000 fr. was lent last year to seventy-nine rural communities or co-operatives for electrification work covering 434 localities with a total population of 202,600 inhabitants. Loans are still outstanding to 262 rural communities or organisations, the reports of which indicate that consumption on the lines built by means of these loans, which spread over twelve departments and cover 5,755 communes, amounted to 908 kWh per kilometre of line during 1938, of which 281 kWh was for power purposes, and 627 kWh per kilometre for lighting. This makes 118 kWh per customer, an appreciable improvement over the previous year. The report goes on to point out that althought it is impossible to estimate the amounts still required to provide 100 per cent. electrification in rural districts, it is certain that much still remains to be done, specially in the western departments. A rough estimate of the amount required is about 2,000,000,000 fr.

The annual report of the Société des Applications Industrielles, an important French holding company with interests in a number of distribution enterprises, strikes a rather more optimistic note than has been customary during the past few years. On the whole, the electrical industry has shown improved sales, the report notes, but what is more important, it has shown greater profits also. This arises on the one hand through improved sales, and on the other, to an even more important extent, through the more normal operation of the electrical indices, which have permitted rates to be brought more nearly into line with operating costs, particularly coal and salary increases.

FINANCIAL SECTION

New Companies. Returns of Capital. Debenture Charges. Bankruptcies and Liquidations. Reports of Electrical Companies. Dividend Announcements. Stocks and Shares

New Companies Registered

Marley Light Co., Ltd.—Private company. Registered December 28th. Capital, £1,000. Objects: To acquire the business of electric lighting and equipment specialists now carried on by E. W. Porch and P. N. Eden at 119, New Cavendish Street, W.1, as the Marley Manufacturing Co. Permanent directors: E. W. Porch, 17, Alexandra Road, Hornsey, N.8, and P. N. Eden, 40, Rosemont Court, Acton, W.3. Registered office: 119, New Cavendish Street, W.1.

Genilite, Ltd.—Private company. Registered December 23rd. Capital, £500. Objects: To carry on the business of manufacturers of and dealers in electric accumulators, wet and dry batteries, acids and containers, &c. Subscribers: V. G. Ward, 58, Wise Road, E.15; and R. L. Miller, 25, The Grove, Ickenham, Middlesex. Solicitors: Abbott & Co., 3 & 4, Clement's Inn, Strand, W.C.2.

Sadd & Halsey, Ltd.—Private company. Registered December 22nd. Capital, £500. Objects: To acquire the business of Sadd & Halsey, electrical contractors, carried on at 821, High Road, Finchley, N.12. Directors: A. M. Halsey and Alice L. Halsey, both of 821a, High Road, Finchley, N.12; and A. J. Halsey, 31, Nether Street, Finchley, N.12. Registered office: 821, High Road, Finchley, N.12.

Chas. E. Cox, Ltd.—Private company. Registered December 23rd. Capital, £1,000. Objects: To carry on the business of electrical engineers and general electrical installation contractors, lighting specialists and contractors, hot-water heating and ventilating engineers, refrigerating and cold storage engineers, &c. Directors: C. E. Cox, 17, Vicarage Road, Stockport; and W. Cox, "South Dene," 9, Doe Hey Road, Bolton. Solicitor: Reginald B. Hamer, 6, Silverwell Street, Bolton.

Hogg's (Electrical), Ltd.—Private company. Registered December 27th. Capital, £400. Objects: To acquire the electrical engineering business carried on by A. M. Hogg at 156, Allerton Road, Liverpool, 18. Directors: H. E. Stone, 42, Towers Road, Liverpool, 16, and two others. Registered office: 156, Allerton Road, Liverpool, 18.

Perihel Export, Ltd.—Private company. Registered December 23rd. Capital, £100. Objects: To carry on the business of manufacturers, importers, exporters and wholesale and retail distributors of and dealers in electro-medical apparatus and appliances, and apparatus and appliances used in connection with all medical and scientific purposes, radio and television instruments, &c. Directors: S. Schaffer, 27, Manor Way, Chesham, Bucks; and I. Troostwijk, 50, Meesham Drive, N.W.9. Registered office: 10, Cullum Street, E.C.3.

Bennett Furnace and Engineering Co., Ltd.—Private company. Registered December 21st. Capital, £500. Objects: To carry on the business of combustion, mechanical, electrical, and general engineers, manufacturers of, agents for and dealers in automatic furnace apparatus, mechanical stokers, &c. L. G. Fretwell, 18, Chelwood Gardens, Kew, is the first director. Secretary: M. Holland. Registered office: Bennett Chambers, 113, Hoe Street, Walthamstow, E.17.

Companies' Returns

Statements of Capital

Brush Electrical Engineering Co., Ltd.—Capital, £1,000,000 in £200,000 preference stock, £549,632 ordinary stock, and 250,368 unclassified shares of £1. Return dated August 15th (filed November 20th), 1939. £200,000 preference stock and £362,318 ordinary stock taken up. £257,024 5s. paid on £257,024 5s. ordinary stock. £305,293 15s. considered as paid on £105,293 15s. ordinary stock and £200,000 preference stock. Mortgages and charges: £396,652. On December 5th, 1939, 4,000 ordinary shares were allotted as fully paid as consideration for the purchase of letters patent and trade marks from Koela Producer Gas Plant Co., Ltd.

Dunmow Light & Heat Co., Ltd.—Capital, £10,000 in £1 shares. Return dated December 1st, 1939. 8,500 shares taken up. £8,500 paid. Mortgages and charges: £1,500.

Reliable Battery Co., Ltd.—Capital, £1,000 in £1 shares. Return dated November 18th, 1939. 651 shares taken up. £651 paid. Mortgages and charges, nil.

Page & Girling, Ltd.—Capital, £2,000 in £1 shares. Return dated November 28th, 1939. All shares taken up. £2,000 paid. Mortgages and charges, nil.

Mortgages and Charges

Norjon Radio and Electrical Services, Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated November 30th, 1939, to secure £775, and ranking in priority to debenture dated February 22nd, 1938. Holder: Mrs. H. C. Grylls, 28, The Terrace, Barnes, S.W.13.

Fredk. Thomas & Co., Ltd.—Issue of July 24th, 1939, of £3,500 debentures, part of a series already registered. Notice of issue filed December 21st, 1939.

Steel & Co., Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated December 8th, 1939, to secure all moneys due or to become due from the company to Martins Bank, Ltd.

Increase of Capital

J. G. Statter and Co., Ltd.—The nominal capital has been increased by the addition of £10,000 beyond the registered capital of £30,000. The additional capital is divided into 10,000 7½ per cent. cumulative participating redeemable preference shares of £1.

Company Liquidations

W. G. Perry & Co., Ltd., electrical contractors, Whitcomb Street, London, W.C.—The statutory meeting of creditors was held on December 28th at Southern House, Cannon Street, London, E.C., when it was reported that the company had gone into voluntary liquidation and had nominated Mr. W. E. Viney, of Butler, Viney & Co., 60, St. Paul's Churchyard, London, E.C., as liquidator. The statement of affairs showed ranking liabilities of £7,864, and in addition there were fully secured creditors for £1,701. The net assets were £5,202, leaving a deficiency, as regarded the creditors, of £2,663. The company, it was stated, was formed in 1921 with a nominal capital of £5,000 of which £2,920 was issued for cash. The company started a new business and for many years was able to trade successfully. The immediate cause of the present position was the financial difficulties which had arisen owing to the long credit taken by public bodies for whom contracts had been carried out. That had tied up the company's working capital, while after the outbreak of the war trade in the West End had been poor. Money had been lost on certain contracts which had been undertaken. A resolution was passed confirming the voluntary liquidation of the company with Mr. Viney as liquidator. A committee was also appointed.

Hough Electric Motor Co., Ltd.—Winding up voluntarily to facilitate the transfer of the business. Liquidator, Mr. W. Dobbs, 167, Ashfield Road, Rochdale.

Bankruptcy Proceedings

T. C. Taylor, 20, Queen Street, Blackpool, electrical contractor.—The application for discharge was heard at the Courthouse, South King Street, Blackpool, recently. The receiving order had been made this year, and the Official Receiver said that the proofs of debt lodged totalled £108. The assets had realised £12, which was insufficient to pay a dividend to the unsecured creditors. The discharge was granted subject to six months' suspension.

H. J. Bruchsaler (H. J. Brooklyn & Co.), electrical distributor, 143, Warwick Road, Olton, near Birmingham, lately trading at Daimler House, Paradise Street, Birmingham.—First meeting to-day (Friday) at 37, Temple Street, Birmingham. Public examination January 24th at the Court House, Birmingham.

A. J. Davis, wireless dealer and electrician, 15, Bridge Street, Exeter.—First meeting January 5th at Exeter Bank Chambers, Broadgate, Exeter. Public examination January 25th at the Castle, Exeter.

Reports and Dividends

R. A. Lister & Co., Ltd., held their annual meeting on December 29th when Mr. P. Lister (chairman), who presided, said the reduction of £26,000 in the current year's earnings could be accounted for, among other things, by the fact that the period under review covered the month of September which was generally the best month in the financial year, and it would be appreciated that that month was far from normal. Their export shipments for October, November and December, however, showed a steady and encouraging increase.

During the year under review they had increased their shareholdings in the Argentine, American, Canadian and French companies and they had purchased a large shareholding in the Le Roi company of Milwaukee, Wisconsin, U.S.A. That company was already in production with the part manufacture of both Lister and Blackstone Diesel engines for distribution to the American market through the American subsidiary, Lister-Blackstone, Inc.

With regard to the future, their factories were not only meeting an ever-increasing pressure of demand for their products in the Services, but were keeping their export trade going. As compared with the record order book a year ago, their order book to-day was over four times greater and 50 per cent. of the orders on hand were for the export trade. It was to be hoped that in the near future both the current export problems as well as the equally vital post-war export trade problems would become the special care of a member of the War Cabinet empowered, not only to co-ordinate the activities of those ministries concerned with these matters, but in co-operation with the exporting industries, take such steps as would ensure continuity of supplies consistent with the essential requirements of the Services during the war, and assure the nation of that essential export volume which would contribute so largely to the solution of our post-war difficulties.

The Notting Hill Electric Lighting Co., Ltd.—The directors state that owing to the serious effects of the evacuation of consumers from the Notting Hill area coinciding with reduced tariffs and increased costs, the earnings of the company for 1939 are not sufficient to meet payment of the final dividend on the 6 per cent. cumulative preference shares. This would normally have been paid on January 1st. The directors add that every endeavour is being made to resume payment of the preference dividends at the earliest date possible, and they hope that the arrears for the half-year of 1939 will be overtaken in 1940.

Solus Teoranta (Eire) is maintaining its interim dividend at 5 per cent.

The Great Northern Telegraph Co. has announced a second interim dividend of 2½ per cent. (same).

(*Continued on p.* 29.)

STOCKS AND SHARES

TUESDAY EVENING.

THE Stock Exchange began the New Year with a confident tone in most markets. Continued absorption of War Loan and other British Government stocks encourages the view that capital is plentiful—a view that has received confirmation from the satisfactory nature of the national subscription to the Defence three per cent. bonds and the latest issue of Savings Certificates. Moreover, the recent war news is read as being in favour of the Allies. Income and surtax claims look formidable in the daily prospect; but, as provision was made previously for these in a large number of cases, the effect of "tax-selling" has been, so far, negligible where Stock Exchange markets are concerned. Cable and Wireless stocks, good-class industrials, and investment issues as a whole show a general strength to which dullness amongst electricity supply shares makes an exception.

Tax-selling

American stocks and shares nearly always show an improvement in the first week of a New Year, following upon a declining tendency in December owing to tax-sales. The latter differ from those known by the same name to the London Stock Exchange. Tax-selling, on this side, is the sale of securities for the purpose of raising money with which to pay taxes. In the United States tax is levied upon realised profits made by investors and speculators. Against such profits, the taxpayer is allowed to set his realised losses. The obvious thing for him to do, therefore, is to sell what shows him a loss if, on the other side of his tax return, he has a realised profit. These sales the New York Exchange terms tax-selling. In some years the selling reaches large proportions; in others, its effect is of no great consequence. But its operation is always expected—and generally allowed for in Wall Street.

Gilt-edged

With most markets of the Stock Exchange looking to the gilt-edged section for a lead, the confident air with which that market faces the New Year has helped to put good heart into many other departments. At 93¾ the War Loan finished the year with a net loss of 4¼ points, but with a clear 5 points lead over the minimum price at which it was unsaleable in the first weeks of the war. In the last days of December prices were stirring in a manner to suggest that yet higher levels will be seen before the Chancellor launches the first market defence loans. The date of the issues remains anybody's guess. But it appears certain that the Treasury will be able to borrow very much more cheaply than seemed, at one time, to be possible. Everyone will hope to see a rising gilt-edged market in the first month or so of the year, not only for its inspiriting effect, but because a point, or even a fraction, in the issue price of Government loans on the contemplated scale, will make a difference of millions of pounds in the cost of the war.

Debenture Stocks

Fixed-interest securities as a whole have automatically had, of course, much the same experience as the gilt-edged market. Over the twelve months losses predominate, and in some cases reach fairly substantial proportions. In the electricity supply group, for instance, County of London 3¼ per cent. debenture, now 84½, shows a loss of practically 10 points. London Power 4 per cents. are 6 points down, at 98½. Lancashire Electric 5 per cents have declined from 113 to 102½, and Edmundsons 4 per cents from 102½ to 98½. The turn of events in the last months of the year, however, has put a more satisfactory complexion on matters. From being difficult to sell at depressed prices, stocks of the kind referred to have become so much sought after that a state of famine now exists in the market. Substantial recovery in prices has failed to tempt holders out of the security of these issues, with the result that buyers are frequently unable to satisfy their persistent requirements to anything like the full extent.

Preference Shares

Generally speaking, preference shares have depreciated in approximately the same measure as debenture stocks, and have also recovered in the closing months of the year. A complication peculiar to preference shares has been a passing attitude of suspicion towards shares quoted at high premiums over par. This is, however, little in evidence at present. A florin generally covers the difference between the prices of electricity supply companies' preference shares now and those of twelve months ago. This is the year's depreciation in, for instance, the 6 per cent. preference shares of County of London at 26s. 6d., Yorkshire Electric at 27s., and Edmundsons at 25s. 6d.; also, in Scottish Power 4 per cents at 18s. 9d., and North-Eastern Electric sevens at 30. In the electrical equipment group rather more ground has been lost on balance. Declines of about 3s. 6d. are shown, for instance, by Associated Electrical 8 per cent. preference at 32s. 6d., General Electric 6¼ per cents. at 27s. 6d., and Henley's Telegraph 4½ per cent. at 18s. 9d. Crompton Parkinson sixes have lost half-a-crown to 25s. Exceptionally, English Electric 6½ per cent. are 2s. to the good at 27s. 6d.

Notting Hill Electric Shock

Results of the shock occasioned by the decision of the Notting Hill Electric Lighting Company to pass the final dividend on its 6 per cent. preference were confined to the shares concerned. Continued firmness of other shares in the group disposed of any idea that the market as a whole—and particularly the London section—might be unsettled. Apparently the market disposition is to treat the event as a special case without general implications, the area served by the company being one on which the results of evacuation fall particularly hardly. In ordinary times these Notting Hill £10 preference shares are ranked among the best securities of the kind. The lapse has occasioned a fall of £2 in the price to £9¼. The company's announcement states that on account of the coincidence of the evacuation with lower tariffs and higher costs the earnings are insufficient to meet the dividend due on January 1st.

London Electricity Charges

County of London Electric shares were in no way affected by the announcement of increases in the Company's charges to the consumer. The Central London Company took a similar step in November. The reasons are familiar enough to anyone interested in the London undertakings' shares. In the case of County of London, the increase in the unit charge is from ½d. to ⅝d. in the London area, and roughly by equal amounts in the suburban and county districts. In the market view, the interests outside London will go far towards compensating for the loss of revenue expected in the centre. At a price of 36s. 3d. for County of London ordinary shares, the yield of about 5¾ per cent. is moderate in comparison with the returns on other of the metropolitan undertakings, implying that the risk of a material cut in the dividend is not seriously considered.

Equipment and Manufacturing

With a rise of 1s. 3d. in the last week of December, Johnson & Phillips shares succeeded in finishing the year at their highest quotation during the twelve months. In November, the company raised the interim dividend from 5 to 7½ per cent., Last year a final of 7½ per cent. was paid in May. Ever Ready units, with a fresh rise of 6d. to 26s. 6d., share the distinction of finishing the year at the top price. The final dividend is due also in May and is the subject of hopeful estimates. On the knowledge that the electrical equipment industries have a highly important part to play in wartime production, the market in the shares concerned remains one of the firmest sections in a generally confident industrial market. Quotations altered but little in the last week of 1939.

Ploughshares and Swords

Evidence accumulates that wartime is going to put "paid," for the time being, to various sorts of businesses, notably those connected with trade in luxuries. Equally plain are the indications that a company deprived of orders for its ordinary products is not necessarily condemned to profitless idleness for the duration. Provided, indeed, that the equipment is adaptable to munitions requirements in one form or another, such a company can sometimes feel fairly certain of work to capacity until the time comes for reversion to normal business. Profits and dividends in the period may be a matter only for conjecture, but they will evidently have substance. Some shareholders, now dejected at the prospect of a dividendless war, may be pleasantly surprised to find their holdings paying satisfactorily for their keep. Cases in point are the radio manufacturers, who can scarcely hope at this time for relief from depression in their normal trade, but whose specialised plant is said to be in demand for the production of many of the more delicate instruments of modern warfare. The chairman of Electric & Musical Industries, for instance, spoke at the recent meeting of a great volume of Government work in hand and in view. At the annual meeting of the British Vacuum Cleaner Co., business in the domestic field was anticipated to be severely restricted, yet the works were said to be occupied day and night on important contracts.

Communications and Transport

Cable and Wireless stocks are firmly sustained at their higher prices by the reports of an active flow of traffic. Great Northern Telegraphs appear to have grounded after the descent to 18 occasioned by the developments in Scandinavia. Marconi-Marines have held their rise to 27s. 6d., and there is some interest in Telephone Properties at around 13s. 9d. Home Railway stocks went to fresh heights on a favourable dividend decision by the L.M.S., which was taken to imply that negotiations between the Government and the railways, over the payment of wartime compensation terms, have reached a stage where the companies are able to see their way with greater confidence. Southern preferred is up from 65 to 66½, and the 5 per cent. preference from 89 to 90. British Electric Traction preferred have put on 3 points to 145. Improvements have occurred in Tillings at 40s. as well as in Bristol Trams at 42s. 6d.

Overseas Companies

Notable among changes in the prices of overseas electricity supply shares is the relapse to 22s. 6d. in Palestine Electrics. Jerusalem Electrics, on the other hand, have hardened to 21s. 6d. Of the Indian companies, Madras are 9d. better at 22s.; the dividend for 1939 is officially forecast at 6 per cent., tax-free, against 8 per cent. previously. Calcutta Trams have jumped 1s. 9d. to 23s. Victoria Falls, at 68s. 9d. x.d., have more than recovered the deduction of the dividend. Mexican Light & Power first bonds have taken a turn for the better in rising from 30 to 35. Anglo-Argentine Tramway issues relapsed into dullness after having enjoyed one of their periodic bouts of activity on hopes based upon the Buenos Aires transport board scheme. Wall Street continues apathetic in the face of good business news.

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1939 High-est	1939 Low-est	Dividend Pre-vious	Dividend Last	Price Jan. 2	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies							
Bournemouth and Poole	68/3	57/–	15	15	58/9	—	5 2 0
British Power and Light	30/9	21/–	7	7	26/–	—	5 7 8
City of London	33/9	23/6	7½	7½	26/6	—	5 13 2
Clyde Valley	37/9	27/6	8	8	33/3	—	4 16 3
County of London	46/9	28/–	10½	10½	36/3	—	5 16 0
Edmundson's :							
7% Pref.	31/6	27/6	7	7	27/6xd	—	5 1 10
Ord.	27/9	18/6	9	6	23/–	−6d.	5 2 2
Elec. Dis. Yorkshire	41/6	32/6	9	9	35/9	—	5 0 5
Elec. Fin. and Securities	47/9	40/–	12½	12½	40/–	—	6 5 0
Elec. Supply Corporation	51/9	41/–	12	12	41/3	—	5 16 0
Isle of Thanet	20/–	15/–	4	4	15/–	—	5 6 8
Lancs Light and Power	34/6	25/–	7½	7½	28/9	—	5 4 4
Llanelly Elec.	22/6	17/6	5½	5½	19/–	—	5 15 9
Lond. Assoc. Electric	30/–	18/3	7	7	19/6	−6d.	7 3 7
London Electric	34/3	22/6	7	7	25/–	—	5 12 0
London Power Deb. Red.	106½	98	5	5	103½	—	4 16 6
Metropolitan	51/–	35/–	12	12	37/–	—	6 9 9
Midland Counties	38/9	30/–	8	8	34/6	−6d.	4 12 9
Mid. Elec. Power	41/9	35/–	8	9	36/3	—	4 19 4
Newcastle Elec.	28/9	26/–	7	7	26/3	—	5 6 8
North Eastern Electric :							
Ordinary	32/3	23/6	7	7	27/–	−6d.	5 3 8
7% Pref.	32/6	27/6	7	7	30/–	—	4 13 4
Northampton	48/–	41/–	10	10	42/6	—	4 15 0
Notting Hill 6% Pref. (£10)	12½	10½	6	6	9½	−2d.	—
Northmet Power :							
Ordinary	46/6	30/6	10	10	36/3	—9d.	5 10 1
6% Pref.	29/–	23/6	6	6	27/–	—	4 9 0
Richmond Elec.	29/–	21/6	7	7	23/9	—	5 18 0
Scottish Power	38/9	28/6	8	8	32/6	—	4 18 6
Southern Areas	22/9	17/–	5	5	18/–	—	5 11 1
South London	30/9	22/–	7	7	22/–	—	6 7 3
West Devon	23/3	18/9	5	5	18/9	—	5 6 8
West Glos	21/3	16/3	2	2½	16/3	—	3 1 6
Yorkshire Elec.	38/6	28/9	8	8	33/9	—	4 14 10
Overseas Electricity Companies							
Atlas Elec.	4/3	1/6	Nil	Nil	2/9	−3d.	—
Calcutta Elec.	39/–	25/–	10*	10*	31/–	—	—
Cawnpore Elec.	34/6	28/3	10	10	27/6	—	—
East African Power	26/3	20/–	7	7	23/6	—	5 19 2
Jerusalem Elec.	24/6	21/–	7	7	21/6	+6d.	6 10 4
Kalgoorlie (10/–)	10/6	9/–	7½	7	10/–	—	7 0 0
Madras	31/–	21/3	8*	8*	22/–	+9d.	—
Montreal Power	35½	30	1½	1½	33½	—	—
Palestine Elec. "A"	29/6	20/–	7½*	5*	22/6	−⅛	4 9 0
Perak Hydro-electric	19/6	13/6	6	2½	19/6	—	2 11 4
Shawinigan Power	25	20	85cts.	83cts.	26	+1	—
Tokyo Elec. 6%	63	37	6	6	57½	—	10 8 8
Victoria Falls Power	73/9	60/–	12½	15	68/9xd.	+1/3	4 7 3
Whitehall Investments Pref.	19/6	12/6	7½	7½	14/–	—	10 14 2
Public Boards							
Central Electricity :							
1950–70	112	103	5	5	106½	—	4 14 0
1955–75	115½	104½	5	5	108	—	4 12 6
1951–73	106½	101	4	4½	103	—	4 7 3
1963–93	95½	84	3½	3½	90	—	3 18 7
London Elec. Trans. Gtd.	88½	83	2½	2½	86½xd.	—	2 17 10
London & Home Counties							
1955–75	107½	105	4½	4½	106½xd.	—	4 4 6
Lond. Passenger Transport :							
A	114½	103	4½	4½	104½	—	4 6 2
B	117½	102	5	5	102½	—	4 17 7
C	83½	64½	4	1½	65	—	2 6 2
West Midland Joint Elec.,							
1948–68	112½	104½	5	5	106	—	4 14 4
Telegraph and Telephone							
American Tel. & Tel.	210	159	9	9	205½	—	4 7 8
Anglo-Am. Tel. :							
Pref.	101½	82	6	6	94½	—	6 7 0
Def.	23⅜	18½	1½	1½	21½	—	6 19 6
Anglo-Portuguese	24/–	17/6	8	8	20/–	—	8 0 0
Cable & Wireless :							
5½% Pref	95½	75	4½	5½	92½	—	5 19 0
Ord.	57½	34	4	4	56½	—	7 1 8
Income	100	87½	—	—	93½	—	4 5 7
Canadian Marconi $1	6/–	3/9	—	Nil	5/–	—	—
Globe Tel. & Tel. :							
Ord.	31/3	23/6	7½*	7½*	27/6	—	5 9 1
Pref.	26/9	22/6	6	6	25/–	—	4 16 0
Great Northern Tel. (£10)	38	18	20	20	20½	—	9 15 2
Inter. Tel. & Tel.	10½	5	Nil	Nil	5	—	—
Marconi-Marine	30/–	23/–	7½	10	27/6	—	7 5 6
Oriental Telephone Ord.	2½	46/3	12*	12*	2⅛	—	5 4 0
Radio Corpn.	8⅞	5⅜	8	6	7½	—	—
Telephone Props.	14/–	12/9	5	6	13/9	—	8 14 6
Telephone Rentals (5/–)	10/–	7/–	10	10	8/–	—	6 5 0
Western Union	40½	19½	2⅜	—	32½	—	—
Traction and Transport							
Anglo-Arg. Trams :							
First Pref. (£5)	7/6	3/6	Nil	Nil	5/–	—	—
4% Inc.	16	5	Nil	Nil	9	−1	—
British Electric Traction :							
Def. Ord.	1025	515	5	5	700	—	—
Pref. Ord.	164	130	8	8	145	+3	5 10 4
Bristol Trams	52/6	36/3	8	10	42/6	+6d.	4 14 1
Brazil Traction	13	7½	$1	50c.	10½	—	—
Calcutta Trams	25/6	20/9	8	8	23/–	+1/9	6 19 2
Cape Elec. Trams	18/–	16/9	5	5	17/–	—	5 17 8
Lancs Transport	37/9	27/6	10	10	30/–	—	6 13 4
Mexican Light :							
1st Bonds	35	20	5	5	35	+5	—
Rio 5% Bonds	82	47	5	5	80	—	6 5 0
Southern Rly. :							
5% Prefd.	75½	48	5	5	66½	+1½	7 10 4
5% Pref.	99½	79	5	5	90	+1	5 11 1
T. Tilling	2½	32/6	10	10	40/–	+⅛	5 0 0
Tilling & B.A.	54/6	43/9	10	9*	45/–	—	4 2 3
West Riding	37/9	30/–	10	10	30/–	—	—
Equipment and Manufacturing							
Aron Electricity Ord.	32/3	22/6	15	15	22/6	—	—
Assoc. Elec. :							
Ord.	45/3	31/3	10	10	38/3	−6d.	5 4 9
Pref.	36/6	31/3	8	8	32/6	—	4 18 6
Automatic Telephone & El.	47/6	39/3	10	12½	42/6	—	5 17 8
Babcock & Wilcox	48/–	37/–	10	12½	41/3	—	6 1 1
British Aluminium Ord.	58/9	48/9	12½	12½	50/–	—	5 0 0
British Insulated Ord.	88/–	72/6	20	20	80/–	—	5 0 0
British Thermostat (5/–)	16/–	12/–	18½	18½	12/6	—	7 8 0
British Vacuum Cleaner (5/–)	22/6	12/6	40	12½	10/–	—	6 5 0
Brush Ord.	5/9	3/9	Nil	Nil	4/–	—	—
Callender's	92/–	52/6	20	15	60/–	—	5 0 0
Chloride Elec. Storage	82/3	62/6	20	15	3½	—	4 5 9
Consolidated Signal	96/–	62/6	36½	36½	65/–	—	9 14 8
Crabtree (10/–)	25/6	17/6	17½	17½	21/3	—	8 4 9
Crompton Parkinson :							
Ord. (5/–)	21/–	12/6	15	20	17/6	—	5 14 3
E. K. Cole (5/–)	9/–	3/–	10	Nil	4/6	+6d.	—
Elec. & Musical Industries (10/–)	14/9	7/–	5	Nil	7/9	+3d.	—
Electric Construction	38/6	31/–	12½	13½	33/9	—	8 0 0
Enfield Cable Ord.	58/6	42/6	25	16½	47/6	+⅛	6 16 10
Electrical Switchgear (10/–)	27/–	21/–	16	10	21/3	—	4 14 3
English Electric	36/6	25/–	10	10	31/3	—	6 8 1
Ensign Lamps (5/–)	16/9	13/9	25	25	15/–	—	8 6 8
Ericsson Tel. (5/–)	43/–	35/–	25*	25*	35/–	—	3 11 5
Ever Ready (5/–)	26/6	18/–	35	30	26/6	+6d.	5 13 2
Falk Stadelmann	27/–	17/6	10	6	18/9	—	6 13 4
Ferranti Pref.	25/6	21/–	7	7	21/3	—	6 11 9
G.E.C. :							
Pref.	31/9	26/3	6½	6½	27/6	—	4 14 6
Ord.	82/–	61/3	17½	20	75/–	—	5 4 4
Greenwood & Batley	27/6	22/6	7	15	22/6	—	13 6 8
Hall Telephone (10/–)	22/3	18/6	15	15	18/9	—	8 0 0
Henley's (5/–)	21/–	15/–	20	20	17/6	—	5 14 3
4½% Pref.	23/–	18/9	4½	4½	18/9	—	4 16 0
Hopkinsons	46/3	37/3	12½	15	42/6	—	7 1 0
India-Rubber Pref.	21/3	18/9	5½	5½	20/–	—	5 10 0
Intl. Combustion	120/–	97/–	32½	32½	5½	—	5 13 0
J. Lucas	60/–	45/–	15	15	56/3	—	5 6 9
Johnson & Phillips	42/6	32/–	12½	12½	42/6	+⅛	5 17 8
Lancashire Dynamo	72/–	50/–	25	25	55/–	—	9 1 10
Laurence Scott (5/–)	12/–	9/6	15	15	9/6	—	7 18 4
London Elec. Wire	31/6	26/–	12	7½	26/3	—	5 14 4
Mather & Platt	50/–	39/–	13½	13½	45/–	+6d.	6 0 0
Metropolitan Elec. Cable Pf.	21/3	21/–	5½	5½	21/3	—	5 3 0
Murex	85/9	63/9	20	20	80/–	—	5 0 0
Pye Deferred (5/–)	13/9	7/6	25	25	7/6	—	16 13 4
Revo (10/–)	35/6	20/–	17½	17½	21/3	—	8 4 9
Reyrolle	61/–	52/6	12½	12½	60/–	—	4 3 4
Siemens Ord.	26/9	18/9	7½	7½	20/–	—	7 10 0
Strand Elec. (5/–)	5/6	2/–	10	4	2/–	—	8 0 0
S. Smith (1/–)	9/–	6/–	37½	50	7/6	—	6 13 4
Switchgear & Cowans (5/–)	15/–	10/–	20	20	11/3	—	8 18 0
Telegraph Condenser (10/–)	7/6	5/–	5	—	7/6	—	—
Telegraph Construction	2½	32/6	10	10	32/6	—	6 3 1
Telephone Mfg. (5/–)	10/–	7/–	9	9	8/–	—	5 12 6
Tube Investments	91/–	72/6	23½	23½	88/9	—	5 8 0
Vactric (5/–)	4/3	2/3	4	Nil	2/6	—	—
Vickers (10/–)	24/6	14/6	10	10	16/6	—	6 1 3
Ward & Goldstone (5/–)	22/6	19/6	20	20	19/9	—	5 1 3
Westinghouse Brake	54/9	36/–	17½	17½	2½	—	7 15 6
Walsall Conduits (4/–)	31/9	21/3	55	55	25/–	—	8 16 0
West, Allen (5/–)	7/6	5/9	7½	10	5/9	—	8 14 0

* Dividends are paid free of Income Tax.

CONTRACT INFORMATION

Particulars of work for which tenders are invited, contracts placed, and building schemes promising work for electrical contractors and traders

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), Great George Street, London, S.W.1.

Australia.—BRISBANE.—January 15th. City Electric Light Co., Ltd. Two steam boilers and accessories. H. Baskerville, secretary, Boundary Street, Brisbane, Queensland.

February 14th. Nine automatic voltage regulators. (T. 29608/39.)*

February 22nd. 11-kV automatic reclosing switchgear. (T. 29937/39.)*

MELBOURNE. — January 30th. Posts and Telegraphs Department. Braided cable. (T. 30032/39.)*

Birmingham.—January 10th. Salvage Department. Fifteen lead-plate batteries for electric vehicles. (December 22nd.)

Electric Supply Department. Transformers for Hams Hall "B" power station, Nechells Prince's power station and Wood Lane sub-station. (See this issue.)

Hucknall.—January 8th. U.D.C. Electrically driven pumping set at Salterford pumping station. Specifications from Rofe & Raffety, 42, Salisbury Avenue, Cheam (deposit £2 2s.).

Iran.—TEHRAN.—January 6th. Centrale Electrique de Tehran. Electrical plant, including turbo-alternators, high-voltage cable, transformers, &c. (T. 29037/39.)

March 1st. Ministry of Industry and Mines. Machinery for a cane sugar factory. (T. 23403/39.)*

London.—BATTERSEA. — February 14th. Electricity Department. Electrical materials for one year from April 1st. (See this issue.)

Luton.—January 8th. Rural District Council. Supply and fixing of two borehole pumps, electric motor and oil engine, together with incidental works, at Kensworth; H. Pickering, 73, West Parade, Dunstable, Beds (deposit £2 2s.).

Manchester.—January 12th. Electricity Department. Domestic cookers for twelve months. (See this issue.)

January 18th. Supply, delivery and erection at the central control room and various sub-stations of batteries and charging equipments. (December 29th.)

Morecambe and Heysham.—January 5th. Electricity Department. Supply, jointing and pressure testing of e.h.v. cables. Excavating, laying and permanent reinstatement. (December 15th.)

New Zealand.—WELLINGTON.—Public Works Department. January 16th. Two sets of 11,000-V metal-clad switchgear. (T. 28857/39.)*

January 23rd. Four 110-kV three-phase outdoor isolating switches. (T. 29122/39.)*

February 6th. Two motor driven centrifugal pumps. (T. 29120/39.)*

February 13th. Three single-phase transformer units. (T. 28146/39.)* Two 2,250-kVA three-phase boosting transformers. (T. 28144/39.)* Remote control equipment. (T. 28791/39.)*

February 20th. Seven single-phase transformer units. (T. 28148/39.)* Four single-phase transformer units. (T. 28147/39.)*

February 27th. 22,000-V switchgear. (T. 28858/39.)* 11,000-V switchgear. (T. 28789/39.)*

March 12th. 110-kV outdoor switchgear and steelwork. (T. 28145/39.)*

March 26th. Four single-phase transformer units. (T. 28143/39.)*

South Africa.—CAPE TOWN.—January 15th. Electricity Department. Booster pumps, complete with driving motors, &c., and piping, two sets of motor starting and control gear, two 3,300-V iron-clad switchboards, two 380/220-V iron-clad distribution boards and one overhead travelling crane. (T. 27966/39.)*

January 17th. Automatic fire protection equipment. (T. 29437/39.)*

DURBAN.—January 19th. General Stores Department. Electrically driven trenching machine. (T.Y. 29779/39.)* Overhead frogs and insulated crossing, &c. (T. 29780/39.)* Porcelain insulators. (T. 30183/39.)*

February 2nd. 6,600-V switchgear. (T. 29782/39.)

PRETORIA.—January 25th. Union Tender and Supplies Board. Magneto generators. (T. 30207/39.)*

Sunderland. — January 12th. Four feeder switch-houses, and two generator switch-houses; borough electrical engineer, Electricity Offices, Dunning Street (deposit £2).

Tunbridge Wells.—Corporation. Electrical installation at municipal block. (See this issue.)

Wolverhampton.—January 15th. Electrical Engineer's Department. E.h.v. switchgear. (December 15th.)

Orders Placed

Aberdeen.—Education Committee. Accepted. Electrical work at the new Girls' High School (£3,842).—John F. Anderson, Ltd.

London.—BATTERSEA.—Electricity Committee. Accepted. Fire-fighting equipment at Grayshott Road sub-station (£765) and Chatham House sub-station (£731).—Mather & Platt.

POPLAR.—Electricity Committee. Accepted. Fittings for electricity showrooms (£3,597).—H. Edmonds & Co.

Salford.—Electricity Committee. Recommended. 150-kW mercury arc rectifier (£500).—Hewittic Electric Co.

Sheffield.—Transport Committee. Accepted. Lamps and fittings for Shoreham Street garage (£228).—R. Neill & Co.

Smethwick.—Works Committee. Accepted. Electrical installation at Windmill Road convenience.—S. W. & S. Electric Power Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Arundel.—Houses (18); F. L. Richardson.

Banbury.—Extensions to factory for Northern Aluminium Co.

Barking.—Factory extension, Abbey Road; W. Warne & Co., Ltd.

First-aid post and cleansing station, hospital grounds; borough architect.

Barnard Castle.—Alterations to the Railway Hotel; manager.

Barnsley.—Completion of 166 houses, Burton Road, &c., for T.C.; borough surveyor.

Barrow.—Central school, Park Drive, for R.C. Authorities.

Bedworth.—Completion of 40 houses, Poplar Farm Estate; U.D.C. surveyor.

Bexhill.—School; Education Committee.

Birtley (Co. DURHAM).—New pit-head baths at Ouston Pit; F. G. Frizzell, architect, Mines Dept., Romney House, Masham Street, London.

Bolton.—Completion of new technical college; borough surveyor.

Boiler house, High Street; R. Watson & Co., Ltd.

Warehouse, Peel Mills, Waterloo Street; Knowles, Ltd.

Bournemouth.—Extensions to Municipal College.

Bristol.—Council offices, College Green (£86,500); city engineer.

Chelmsford. — Rebuilding offices, Springfield Road; Brown & Sons, Ltd.

Cheshunt.—Underground report centre, with cleansing station above; A. Burton Stibbon, surveyor, Manor House, Cheshunt, Waltham Cross.

Corby.—Houses, Oakley Road Estate; U.D.C. surveyor, Council Offices.

Cradley Heath.—New store and chain shop, Eagle Chainworks, Corngreaves Road; Samuel Woodhouse & Sons.

Darwen.—Health centre, Union Street, for T.C.; borough surveyor.

Dewsbury.—Drying and store sheds, Jilling Ing, Earlsheaton; S. Lyles, Sons & Co., Ltd., yarn spinners.

Distington (CUMBERLAND). — Light alloy factory, for High Duty Alloys, Ltd., Redditch.

Dolgelley.—Housing scheme, Llanegryn; R.D.C. surveyor.

Doncaster.—Completion of extensions, Oswin Avenue School; Walker & Thompson, architects, 16, South Parade.

Dundee.—Shelter accommodation for school children (£31,000), for E.C.; burgh surveyor.

Eastbourne.—Extensions (£16,600) at St. Mary's Hospital.

Shops and flats, Cormfield Road; National Provincial Bank, Ltd.

Eston.—Shelters (£47,873); U.D.C. surveyor.

Feltham.—Cleansing station and garage, Ashmead Road highways depôt, for U.D.C.; surveyor, Council Offices, Feltham, Middlesex.

Folkestone.—Cleansing station, Bradstone Avenue and Cheriton High Street; borough surveyor.

Gateshead.—Rebuilding of furniture factory for J. J. Boyd & Son, Hillgate Quay, Gateshead.

Glasgow.—Boiler house at Victoria Infirmary; Watson, Salmond & Gray, architects, 111 Union Street.

Reconstruction of church, Clifton Street (£24,000); A. McInnes, Gardner &

(Continued on next page.)

Financial Section *(Concluded from page 26)*

The Adelaide Electric Supply Co. reports a net profit for the year to August 31st of £366,348, as compared with £365,592 in the preceding year. The ordinary dividend is maintained at 10 per cent., tax free, reserve receives £118,690 and the balance carried forward is £146,185 (against £146,027 brought in). The combined reserves now amount to £1,149,888.

The Burma Electric Supply Co. reports a net profit for the year ended July 31st, after placing £5,000 to reserve and depreciation, of £4,629, as compared with £9,054 for 1937-38. The preference dividend is paid but no distribution is made on the ordinary capital (against 1½ per cent.). The balance carried forward is £9,174 (against £11,745 brought in).

The Philco Radio & Television Corporation of Great Britain, Ltd., has passed the preference dividend due on January 1st. The dividend is paid to June 30th, 1937.

The Telegraph Condenser Co., Ltd., announces that the dividend due on January 1st on the 6 per cent. cumulative preference shares will be postponed. The dividend on these shares has been paid to June 30th, 1938.

The Rheostatic Co. is paying a final dividend of 12 per cent. (against 4 per cent.), making 16 per cent. less tax, for the year (against 8 per cent.). The net profit for the year to Sept. 30th is £19,015, as compared with £11,345 for 1937-38.

Partners, architects, 237, West George Street.

Church Hall, Greenrig Street, for Church of Scotland General Trustees, 121, George Street, Edinburgh; Bryden. Robertson & Boyd, architects, 147, Bath Street.

Guisborough.—Factory extensions for Blackett, Hutton & Co., Ltd.; H. C. Garbutt, architect, 18, Albert Road, Middlesbrough.

Hanley.—Works extensions, Weaver Street; R. H. Bell, Ltd., Marsh Street.

Warehouse extensions, Swan Street; J. Titley & Sons, Ltd., Empson Street.

Harrow.—Shops, site of Victoria Hall, Station Road, and new hall, 2-8, Sheepcote Road; Rev. H. W. Beck, vicar of St. John's Church.

Harwich.—Extensions to factory, for C. Bernard & Sons, Main Road; Paine & Hobday, architects, 2, Millbank House. Wood Street, London, S.W.1.

Haverfordwest.—Housing site, Dunston Pits; R.D.C. surveyor.

Hebburn-on-Tyne.—Licensed premises, Hedgeley Road, for W. McEwan & Co., Ltd., brewers, Edinburgh.

Herne Bay.—Mortuary, Beach Road (£960); U.D.C. surveyor.

Hove.—Hotel, Nevill Road, for Kemp Town Brewery.

Bungalows, Northease Drive, &c.; H. D. Little.

Jarrow (Co. DURHAM).—School shelters for 2,580 children for the E.C., and deep shelters for the T.C.; J. S. Weir, borough engineer.

Kinghorn.—Fire station, for T.C.; burgh chamberlain, 46, High Street.

Kingston - on - Thames.—Underground air-raid shelter (£8,000), Horsefair-Wood Street site, for T.C.; borough surveyor.

Leyland.—Houses, Leyland Lane; R. Rimmer, builder, 19, Upper Aughton Road, Birkdale, Southport.

Lichfield. — Houses in Curborough Road, for Hayes Bridge Estate.

Lindsey.—Completion of technical college, Gainsborough (£45,000), for E.C.; county architect, County Offices, Newland, Lincoln.

Liverpool.—Extensions to factory, for John Peok & Co., Edge Lane; T. A. Ashworth & Sons, architects, 14, Castle Street, Liverpool.

London. — FULHAM. — Public air-raid shelters for Borough Council; R. Dixon & Sons, Britannia Works, Park Walk, S.W.10 (three shelters, £320, £3,850 and £2,379), and Taylor Woodrow (Construction), Ltd., Ruislip (£1,281).

Luton.—Completion of Stopsley Mixed School, and additions to Hitchin Road Girls' School, for E.C.; J. W. Tomlinson, architect, Town Hall.

Malton (YORKS).—Isolation hospital in Norton Grove; U.D.C. surveyor.

Manchester.—Extensions to depôt garage (£7,360); cleansing superintendent.

Improvements at Nurses' Home, Withington Hospital (£3,200); city engineer.

Middlesex.—School, Park Road, Ashford, for E.C.; director of education, 10, Great George Street, London, S.W.1.

Morecambe. — Extensions, transport depôt; H. Hillman & Sons.

Normanton.—Fire station, for U.D.C.; surveyor, Council Office, High Street.

Northern Ireland.—BELFAST.—New factory in Waterford Street, for Belfast Silk & Rayon, Ltd.

Nottinghamshire. — School shelters (£13,000), for E.C.; county architect, Shire Hall, Nottingham.

Nuneaton.—New stores, house and shop, Ventnor Street and Knightsbridge Road; Jas. Eadie, Ltd.

Pendleton.—Rebuilding branch bank in Chapel Street, for Martins Bank, Ltd., 7, Water Street, Liverpool, 2; C. Musker Bros., Ltd., Bingham Street, Swinton, Manchester.

Pershore. — Improvements, Isolation Hospital, for Joint Board; secretary.

Pontefract.—Completion of Tanshelf Junior School, for T.C.; borough surveyor.

Portsmouth. — New warehouse, for Curtis & Sons, Ltd., London Road.

Renfrew.—Houses (22), Waterfoot; MacLeod, Builders, Ltd., Glasgow.

Romford.—Cleansing station, Havering Road, for B.C.; borough surveyor, Town Hall, Romford, Essex.

Rowley Regis.—Alterations to Blackheath and Beeches Road schools, for E.C.; F. T. Wilson, secretary, Municipal Offices, Old Hill.

Ryde (ISLE OF WIGHT).—Proposed new offices, for T.C.; borough surveyor, Lind Street, Ryde.

Sheffield.—Completion of schools at Parson Cross Estate, and erection of senior mixed department at Southey Hill, junior mixed and infants' department at Foxhill, and junior mixed and infants' department at Lindsey Road; W. G. Davies, city architect, Town Hall.

First portion of technical college scheme, Arundel Street (£60,000), for E.C.; city surveyor.

New factory in Edith Lane, for R.E.P. Engineering Co., Owlerton.

Works additions, Attercliffe Road; Tempered Spring Co., Ltd.

Factory and offices, Worthing Road; Strong's British Trist Co., Ltd.

Offices and laboratory, Carbrook; Wm. Jessop & Sons, Ltd.

X-ray room and offices, Vulcan Road; Hadfields, Ltd.

Shrewsbury.—Completion of dispensary and pathological laboratory, for Royal Salop Infirmary governors; Shayler & Dilks, architects, Dana Chambers, Castle Gate.

Sidmouth.—Extensions, Whipton Isolation Hospital (£4,000); U.D.C. surveyor.

Smethwick.—New offices, Alma Street; Twisteel Reinforcement, Ltd.

Enlargement of police and fire stations; borough engineer.

Rebuilding of laboratory, Dartmouth Road; Birmingham Aluminium Casting Co., Ltd.

South Shields.—Stores, Westoe Road, for the Jarrow and Hebburn Co-operative Society; C.W.S. Building Dept., West Blandford Street, Newcastle-on-Tyne.

Stonehouse.—New factory, for Sperry Gyroscope Co., Ltd., Stonehouse Works; Gardner & Sons, architects, London Road, Stroud.

Stourbridge.—Public air-raid shelter, Rock Cellars, Duke Street, for T.C.; G. N. Maynard, borough surveyor, Council House, Stourbridge.

Swansea. — Waterworks (£816,000); water engineer.

Tendring.—Housing schemes (£17,470), for R.D.C.; Surveyor's Department, Weeley House, Weeley.

Tividale.—Extensions, Britannia Wire Works, Upper Chapel Street; Abco, Ltd.

Urmston.—Fire station and shelters, Trafford Park; U.D.C. surveyor.

Wallsend.—Air-raid shelters at St. Columba's and St. Aidan's Schools; R. Burke, architect, Singleton House, Northumberland Road, Newcastle-on-Tyne.

Wellingborough. — Houses, Grendon and Orlingbury; H. W. Sheffield, surveyor, 13, Oxford Street.

Welwyn Garden City.—Houses (126), Homestead Lane; Welwyn Garden City, Ltd.

West Hartlepool. — Extensions to Technical College, for E.C.; borough engineer.

West Kesteven.—Hairdressing saloon, Ancaster; Miss A. Bottomley.

Houses, Barrowby, C. P. Caunt and L. H. Hobbin.

Weston-super-Mare.—Cubicle block, laundry, and bathing accommodation, Isolation Hospital, for T.C.; borough surveyor.

Whitley Bay.—Houses, Monks Road; R. A. Gofton & Sons, builders, Front Street, Monkseaton.

Wigan.—Rebuilding portion of jam works, Soho Street, for W. Hurst & Sons, Ltd., Soho Street; D. A. Ablett & Sons (1938), Ltd., contractors, Sovereign Road. Wigan.

Wigton.—Houses for the Bucks and Middlesex Estates, Ltd.; H. I. Graham, architect, Bank Street, Carlisle.

Wisbech.—Cubicle block (£4,000), Isolation Hospital, for Joint Board; secretary to Committee.

Wolstanton.—R.C. Guildhall extension; Rev. T. V. Bagnall, Church of Sacred Heart, Dimsdale Parade.

Wombwell.—Laboratory and stores, for Wombwell Foundry and Engineering Co., Ltd.

York.—Children's home, Feversham Crescent; city architect.

Business premises, Davygate & New Street; Malton Investment Trust.

Additions, Little John Hotel, Castlegate; J. J. Hunt, Ltd.

Estate development, Carr Lane, Acomb; J. S. Barlow's trustees.

January Meetings

Institution of Electrical Engineers.—Thursday, January 11th. 12.30 p.m. Savoy Place, London. Formal submission of list of applicants for election and transfer.

Thursday, January 25th. 6 p.m. "Fire-fighting Equipment for Electrical Installations" (E.R.A. Report V/T8) with cinematograph film in colour, discussion to be introduced by Messrs. H. W. Swann (Home Office Factory Inspectorate), J. Hacking (Central Electricity Board) and R. A. McMahon (E.R.A.).

WESTERN CENTRE.—Monday, January 15th. 3 p.m. South Wales Institute of Engineers. "Electrically Manufactured Steels," by Mr. H. A. Sieveking.

SCOTTISH CENTRE.—Tuesday, January 23rd. 6.30 p.m. Royal Technical College, Glasgow. Excerpt from Prof. S. Parker Smith's chairman's address.

Illuminating Engineering Society.—Tuesday, January 9th. E.L.M.A. Lighting Service Bureau, London. 6 p.m. "Discomfort Glare in Lighted Streets," by Mr. Ralph G. Hopkinson.

Association of Mining Electrical Engineers (LONDON BRANCH).—Tuesday, January 9th. Junior Institution of Engineers, London. 6 p.m. "A Guide to the Selection of Switchgear for use Underground in Mines," by Mr. H. Taylor.

Royal Society of Arts.—Wednesday, January 17th. Adelphi, London. 2.30 p.m. "Applications of X-ray Technique to Industrial Problems," with demonstrations and lantern slides, by Mr. H. P. Rooksby (G.E.C. Research Laboratories) and Dr. V. E. Pullin (director, Radiological Research, Woolwich).

Mondays, January 29th, February 5th and 12th. 4 p.m. (three Cantor Lectures). "Metals as Engineering Materials," by Dr. C. H. Desch.

Wednesdays, January 3rd and 10th. 2.30 p.m. (two Dr. Mann Juvenile Lectures with demonstrations). "New Lamps for Old," by Dr. H. W. Melville.

Institution of Mechanical Engineers.—Friday, January 19th. Storey's Gate, London. 3 p.m. Thomas Hawksley Lecture, "A Review of Forty Years' Development in Mechanical Engineering Plant for Power Stations," by Sir Leonard Pearce (engineer-in-chief, London Power Co., Ltd.).

Electrical Industries Benevolent Association (NORTHERN COUNTIES AREA).—Thursday, January 25th. 2.30 p.m. Tilley's Restaurant, Blackett Street, Newcastle-upon-Tyne, 1. Annual general meeting. Chairman, Col. S. E. Monkhouse.

Junior Institution of Engineers (North-Western Section).—Saturday, January 20th. Engineers' Club, Manchester. Annual general meeting and smoking concert.

Friday, January 26th. The Institution, London. 6.30 p.m. Informal lecture on "The Advantages Accruing to Forced Circulation Boilers, with special reference to the La Mont type," by Capt. R. E. Trevithick.